`SDMS US EPA Region V

Imagery Insert Form

EPA Region 5 Records Ctr.

206921

Document ID:

Some images in this document may be illegible or unavailable in SDMS. Please see reason(s) indicated below:

☐ Illegible due to bad source documents. Image(s) in SDMS is equivalent to hard copy.

Specify Type of Document(s) / Comments:

☐ Includes _____ COLOR or _____ RESOLUTION variations.
Unless otherwise noted. these pages are available in monochrome. The source document page(s) is more legible than the images. The original document is available for viewing at the Superfund Records Center.

Specify Type of Document(s) / Comments:

☐ Confidential Business Information (CBI).
This document contains highly sensitive information. Due to confidentiality, materials with such information are not available in SDMS. You may contact the EPA Superfund Records Manager if you wish to view this document.

Specify Type of Document(s) / Comments:

X Unscannable Material:
Oversized _____ or _____ Format.
Due to certain scanning equipment capability limitations, the document page(s) is not available in SDMS. The original document is available for viewing at the Superfund Records center.

Specify Type of Document(s) / Comments:

Maps

☐ Document is available at the EPA Region 5 Records Center.

Specify Type of Document(s) / Comments:

= MLL 5/2/91

TECHNICAL MEMORANDUM NO. 1
DESCRIPTION OF CURRENT SITUATION REPORT
REMEDIAL INVESTIGATION
PHASE I, TASK 1

LENZ OIL SERVICE, INC.
LEMONT, ILLINOIS

REVISION: 1

SUBMITTED BY:

LENZ OIL SETTLING RESPONDENTS

MAY 2, 1991

PREPARED BY:

ENVIRONMENTAL RESOURCES MANAGEMENT-NORTH CENTRAL, INC.
102 WILMOT ROAD, SUITE 300
DEERFIELD, IL 60015

ERM PROJECT NO. 0252

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES
(Continued)

1.0 INTRODUCTION

This Technical Memorandum describes the results of the background study conducted as part of Phase I, Task 1 of the Lenz Oil Site Remedial Investigation/Feasibility Study (RI/FS). The background study consisted of compiling and analyzing existing data regarding the physical characteristics, history, and nature and extent of contamination at the site. The specific activities that were accomplished during the background study are described in Sections 5.1.1 through 5.1.9 of the Lenz Oil RI/FS Work Plan (ERM-North Central, Inc., 1990).

The background study was conducted to: (1) help determine what additional data are necessary to characterize this site, (2) develop a better conceptual understanding of the site, (3) better define the applicable or relevant and appropriate requirements (ARARs), and (4) narrow the range of remedial alternatives that have been identified. Most of the background study was performed prior to the development of the Lenz Oil RI/FS Work Plan and was used to determine the initial scope of the Lenz Oil Site RI/FS. The results of the initial background study are presented in Sections 2.0 and 3.0 of the Lenz Oil Site RI/FS Work Plan (ERM-North Central, Inc., 1990).

Supplemental background study activities were included in Phase I, Task 1 of the Lenz Oil RI/FS to evaluate the existing data more thoroughly and to better define the scope of Phase I, Task 2 and Phase II, Task 1 activities. Furthermore, these additional background study activities have resulted in a better characterization and conceptual understanding of this site.

Technical Memorandum No. 1 (TM1) is being submitted on behalf of the Lenz Oil Settling Respondents in accordance with Article IX, Part A of the Administrative Order by Consent (USEPA, 1989) and Section 5.1.10 of the Lenz Oil Site RI/FS Work Plan (ERM-North Central, Inc., 1990).

2.0 PHYSICAL CHARACTERISTICS OF THE SITE

2.1 Site Location

The Lenz Oil site is situated northeast of the intersection of Illinois Route 83 and Jeans Road in southeastern DuPage County, Illinois (Figure 2-1). The site is approximately 3.5 miles northeast of the center of Lemont, Illinois and is located in the southeast 1/4 of Section 11, T37N, R11E, of the Sag Bridge 7.5-minute quadrangle.

2.2 Site Description

The Lenz Oil site is bounded by the Atchison, Topeka, and Santa Fe Railroad to the northwest; Illinois Route 83 to the southwest; Jeans Road to the southeast; and a private residence/small business to the northeast. The site is legally described as follows:

> Lot 3 of Jacob J. Jeans plat of survey as part of the southeast quarter of Section 11, Township 37 North, Range 11 East of the 3rd principal meridian, in DuPage County, Illinois, according to the Plat thereof recorded October 7, 1950 as document 606585, except the part of Lot 3 lying northeast of a line perpendicular to Jeans Road from a point which is 202.0 feet southwest, as measured along the southeastern line of Lot 3, of the southeastern corner of Lot 3.

ERM-North Central, Inc. (ERM-North Central) retained Patrick Engineering to perform a boundary and topographic survey of the 4.9-acre Lenz Oil site and the area surrounding the site. A base map, illustrating the topography of the site and all pertinent site features, was produced from the survey data (Figure 2-2). A 100-foot grid was established on the site to ensure the accurate location of sample points. As illustrated on Figure 2-2, the site is currently a vacant grassy area containing a radio antenna, several monitoring wells, a fire hydrant, and two underground utility manways.

2.3 Physiography

The Lenz Oil site is located in the Wheaton Morainal Country Subsection of the Great Lakes Section of the Central Lowland Physiographic Provence (Willman, 1971). In general, the Wheaton Morainal Country is characterized by physiographic features sculpted by continental glaciers. It contains rough knob and kettle topography, kames, kame terraces, and eskers, all of which are among the youngest Wisconsinan drift deposits. This widespread mantle of glacial drift was deposited over an irregular bedrock erosional surface. The thickness of the drift varies, depending on the nature of the bedrock topography, the glacial history, and the amount of post-glacial erosion.

The physiography of the area immediately surrounding the Lenz Oil site is one of undulating uplands, which have been dissected by well-developed drainage channels and rivers. The uplands are characteristic of the rough-surfaced moraines of the Valparaiso Morainic System, portions of which contain pot-hole lakes and wetland areas. Erosion along the Des Plaines River has removed the glacial deposits along the river pathway, thereby exposing the underlying bedrock in a number of areas.

The Lenz Oil site is located in the flood plain of the Des Plaines River, where the river cuts through the rough knob and kettle topography of the Valparaiso Morainic System. As shown on Figure 2-1, the site is situated at the base of a 75-foot bluff that defines the northern boundary of the Des Plaines River Valley. The river valley is relatively smooth and flat compared to the adjacent moraine deposits. The Des Plaines River is approximately 600 feet southeast of the site, and the Chicago Sanitary and Ship Canal is an additional 800 feet beyond the Des Plaines River. On the north side of the Des Plaines River, the regional slope is toward the southeast (i.e., toward the river); however, the site topography has been modified, and part of the site now slopes toward the northwest, where a small ephemeral drainage ditch is situated. The elevation of the site is approximately 600 feet above sea level.

2.4 Land Use

The Lenz Oil site and most of the surrounding area are either idle and undeveloped or used for commercial, light industrial, or residential purposes (Figure 2-3). The site itself is currently vacant and idle. Immediately northwest of the site, the Atchison, Topeka, and Sante Fe Railroad operates an active railroad line. The land northwest of the railroad is primarily wooded open land with a few isolated residential and commercial properties. The areas immediately northeast and southeast of the Lenz Oil site are used for residential purposes; however, large portions of the land are undeveloped and idle. Further east of the site, the land is utilized for commercial and light industrial purposes (i.e., auto wrecking, fire wood cutting, and paving). The property southwest of the site is also used for commercial purposes (i.e., a large auto wrecking facility). The land south of the Lenz Oil site, between the Des Plaines River and the Chicago Sanitary and Ship Canal, consists of wetlands and idle woodland.

There are several notable land use features outside the immediate vicinity of the Lenz Oil site. The Argonne National Laboratory reservation is located approximately 1,400 feet northwest of the site. The southern border of the community of Downers Grove is situated approximately 3,500 feet north of the site. Much of the area southeast of the site, across the Des Plaines River and the Chicago Sanitary and Ship Canal, consists of forest preserve and wetlands. Finally, there are several large industrial complexes situated along the Des Plaines River, both upstream and downstream of the Lenz Oil site.

2.5 Site Access

Access to the Lenz Oil site is controlled by a combination of wire, chain-link, and wooden fencing. As shown on Figure 2-2, the fencing is continuous along the southeastern half of the site, but gaps in the fencing occur in the northern and western corners of the site. Two gates in the fencing along Jeans Road, which are secured with chains and locks, serve as the primary entry points to the site. No on-site personnel control access to the property.

2.6 Surface Water Hydrology

The Lenz Oil site is located within the Des Plaines River subbasin of the Mississippi River watershed. It is situated within the Des Plaines River Valley, which contains the Chicago Sanitary and Ship Canal, the Illinois and Michigan Canal, and the Des Plaines River/Diversion Channel (Figure 2-1). The Des Plaines River and the Chicago Sanitary and Ship Canal merge into a single river approximately three miles north of Joliet. The Calumet Sag Channel, which is an extension of the Little Calumet River, discharges to the Chicago Sanitary and Ship Canal, approximately 3/4 miles southwest of the Lenz Oil site (Figure 2-1). All of surface water in the Des Plaines River Valley flows to the southwest and eventually empties into the Mississippi River. The Des Plaines River is approximately 200 feet wide at its closest approach to the Lenz Oil site; whereas the adjacent Chicago Sanitary and Ship Canal is approximately 150 feet wide at the same location. According to the Illinois State Water Survey (ISWS), the discharge of the Des Plaines River in the vicinity of the site (i.e., the Riverside gage) ranged from 147 cubic feet per second (cfs) to 3,720 cfs in 1989. The maximum flow recorded in Des Plaines River since installation of the Riverside gage in 1943 is 9,770 cfs. Based on measurements taken at the Romeoville gage, discharge in the Chicago Sanitary and Ship Canal ranged from 1,790 cfs to 12,800 cfs in 1989. The maximum flow recorded in the Chicago Sanitary and Ship Canal since 1974 is 16,300 cfs.

Surface water runoff from the Lenz Oil site and the immediate vicinity of the site either infiltrates the soil or discharges to the Des Plaines River. There are no permanent storm sewer or draining systems to direct surface water runoff from the site. However, a small ephemeral drainage ditch, situated along the northwest border of the site, is the recipient of surface water runoff from the northern half of the site and from the area northwest of the site. This drainage ditch apparently meanders through the auto wrecking facility southwest of the site and eventually discharges to the Des Plaines River. Although pot-hole lakes are common in the upland areas surrounding the site and several wetland areas are located in the Des Plaines River Valley, no permanent surface water bodies are situated within the bounds of the Lenz Oil site.

2.7 Geology

2.7.1 Stratigraphy of Southeastern DuPage County

The geology of southeastern DuPage County consists of a thick sequence of Silurian bedrock overlain by Quaternary glacial drift and alluvial deposits. A generalized stratigraphic column for the Chicago area is shown on Figure 2-4. The uppermost bedrock in the study area is Silurian dolomite of the Racine Formation, which is the uppermost unit in the Niagaran Series (Willman, 1971). The Racine Formation is a light-gray, pure to silty, sometimes cherty, well-bedded dolomite. The formation crops out: (1) along the northern bluffs of the Des Plaines River Valley, (2) along the banks of the Des Plaines River and the Chicago Sanitary and Ship Canal, (3) on valley floors of large tributary streams, and (4) in quarries in the vicinity of the site.

Underlying the Racine Formation are the Sugar Run and Joliet Formations, which are also part of the Niagaran Series, and the Kankakee and Elwood Formations, which are part of the Alexandrian Series (Willman, 1971). The lithologies of these formations are similar to the overlying Racine Formation. The thickness of the Silurian dolomite varies across southeastern DuPage County because of differential pre-glacial and post-glacial erosion of the bedrock surface. A test boring drilled in the Palos Forest Preserve, which is across the Des Plaines River Valley from the Lenz Oil site, encountered 171 feet of Silurian dolomite before penetrating the underlying bedrock unit (Nicholas and Healy, 1988).

The bedrock surface in southeastern DuPage County is an irregular plain, most of which was shaped by Pleistocene glacial erosion (Willman, et al., 1975). Data from outcrops and borings show that the bedrock has a gently rolling, dissected surface with a well-integrated drainage pattern. A number of deep (up to 150 feet) paleo-river valleys were cut into the underlying bedrock during a major deglaciation event in the area. According to Zeizel and others (1962), the orientation of the paleo-river valleys in DuPage County is controlled by major joints sets in the underlying bedrock. Furthermore, preliminary interpretation of recently compiled seismic-refraction data collected by Nicholas and Healy (1988) suggests that the bedrock surface is a former karst plain. Outcrop and boring data support the karst plain interpretation by documenting the presence of a weathered zone, up to 5 feet thick, at the top of the Silurian dolomite.

Unconsolidated deposits of Quaternary age overlie the Silurian bedrock throughout southeastern DuPage County, except where it has been removed by man or erosion and the underlying bedrock is exposed (Willman, 1971). Most of the unconsolidated deposits consist of Pleistocene glacial drift. The glacial drift is generally of Wisconsinan age and consists primarily of the Wadsworth Till Member of the Wedron Formation, which is a silty and pebbly clay till with local beds of sandy to gravelly moraine deposits (Willman and Lineback, 1970). The Wadsworth Till Member is widespread in uplaid areas, but has been removed by erosion from the Des Plaines River Valley. A thin veneer of Holocene alluvium is present along portions of the Des Plaines River Valley. The alluvium consists of valley-train deposits of the Mackinaw Member of the Henry Formation (Willman and Lineback, 1970). The Mackinaw Member is a poorly sorted, silty sand with local deposits of sandy gravel.

2.7.2 Stratigraphy of the Lenz Oil Site

Eleven stratigraphic borings have been drilled during previous environmental investigations of the Lenz Oil site. The approximate locations of these borings are shown in Figure 2-5, and copies of the original geologic and well construction logs are included as Appendices A and B, respectively. As shown on Figures 2-6 and 2-7, the Racine Dolomite was encountered at the site at depths ranging from 6.0 to 24.5 feet below ground surface. The bedrock is rubbly at the top and fractured throughout the encountered interval. In general, the bedrock surface becomes shallower toward the southeast; however, on a small scale, the bedrock surface is extremely irregular.

The dolomitic bedrock is directly overlain by a bed of silty dolomitic gravel with varying amounts of sand and clay. This deposit was interpreted as glacial outwash by the IEPA physical measurement unit, but it is more likely a layer of weathered dolomite that has escaped erosion and redeposition. A bed of silt, containing variable amounts of sand, clay, and gravel, overlies the weathered dolomite. These poorly sorted deposits are either valley train sediments of the Mackinaw Member of the Henry Formation or, more likely, alluvial deposits associated with the Des Plaines River.

2.7.3 Structural Geology and Regional Fracture Analysis

All of northern Illinois, including the Lenz Oil site, is located within the Central Stable Region tectonic province of the North American continent. The region is characterized by a sequence of southward-thickening sedimentary strata overlying Precambrian basement rocks, which were subject to a series of vertical crustal movements that formed broad basins and arches during the Paleozoic and early Mesozoic time periods. The arches and basins subsequently have been modified by local folding and faulting activity. The major geologic structures in the vicinity of the Lenz Oil site include:

- Illinois Basin - an oval-shaped basin with a depocenter located south of the Lenz Oil site in South-Central Illinois. Strata in the basin rises gently toward the Kankakee Arch in the northeast.

- Kankakee Arch - a northwest-southeast trending extension of the Wisconsinan Arch. The Arch is a result of crustal uplift.

- Sandwich Fault Zone - a northwest-southeast trending vertical fault, approximately 85 miles in length. The fault has about 900 feet of vertical displacement, and all movement along the fault is post-Silurian and pre-Pleistocene.

The Lenz Oil site is located on the crest of the Kankakee Arch, near the northeastern edge of the Illinois Basin. The southeastern extent of the Sandwich Fault Zone is approximately 23 miles southwest of the Lenz Oil site at its closest approach. Although all of these structural features are presently inactive, past activity has strongly influenced the local character of bedrock. For example, in the vicinity of the Lenz Oil site, the Silurian strata dip slightly to the east and southeast because of the eastward plunge of the Kankakee Arch. Furthermore, tensile stress from subsidence of the Michigan and Illinois Basins and uplift of the Wisconsinan and Kankakee Arches has caused jointing in the brittle Silurian dolomite (Foote, 1982). Joints in the dolomite occur in three mutually orthogonal sets, two of which are vertical and one of which is horizontal (Nicholas and Healy, 1988). The vertical sets of joints were caused by structural deformation, as noted above; whereas the horizontal set was formed as a result of carbonate dissolution along bedding planes. According to Zeizel and others (1962), the orientation of bedrock valleys in DuPage County is controlled by these major joint sets.

The U.S. Geological Survey conducted research into the orientation and spacing of joint sets in the Silurian dolomite as part of their study to determine the geologic and hydrologic factors that control migration of tritium from a closed, low-level radioactive waste disposal site, located approximately 1.5 miles southeast of the Lenz Oil site. The joint analyses included lineament mapping, bedrock surface mapping, and studies of joint orientations exposed in outcrops of the Silurian dolomite (Nicholas and Healy, 1988). The orientations of 156 vertical joints, measured in two quarries were plotted on a rose diagram by plotting 1-unit length per joint and grouping the joints into 5-degree sectors (Figure 2-8). A total of 106 linear structural features were mapped on aerial photographs of the 25-square-mile area surrounding the low-level radioactive waste disposal site and plotted on a rose diagram by using 1-unit length per 100 feet of lineament length and grouping the lineaments into 5-degree sectors (Figure 2-8). The rose diagram of the vertical joint orientations shows two orthogonal sets of joints: one set of joints with an azimuth of 40 degrees, and the other set with an azimuth of 130 degrees. The rose diagram of the lineaments reveals three major sets: two of which correspond to the vertical joint sets and one set, which is oriented at 20 degrees azimuth and has no apparent analogy among the vertical joint sets.

Zeizel and others (1962) and Foote (1982) have shown that the frequency and aperture of vertical joints in the vicinity of the Lenz Oil site decrease with depth below the bedrock surface. This interpretation is based on the assumption that private wells are generally set opposite the most productive portion of an aquifer, which in the case of the Silurian dolomite would be the most highly fractured portion of the aquifer. By plotting well frequency versus depth of penetration into the Silurian dolomite, Zeizel and others (1962) concluded that the upper 60 feet of the dolomite is the most productive portion of the aquifer. Although unconfirmed by direct field measurements, significant fractures probably extend at least 60 feet into the dolomite; however, this conclusion is preliminary and may not accurately describe the bedrock below the Lenz Oil site.

Because Nicholas and Healy (1988) collected their lineament and vertical joint orientation data from an area that included the Lenz Oil site, data from their study are considered applicable to the Lenz Oil investigation. However, as proposed in Section 5.1.9 of the Lenz Oil RI/FS Work Plan (ERM-North Central, Inc., 1990), ERM-North Central conducted a regional fracture analysis to independently verify the findings of previous investigations. This field investigation was conducted between March 16 and April 7, 1991.

ERM-North Central performed reconnaissance of the area within approximately 1.5 miles of the site to locate outcrops of the Silurian dolomite to be used for the collection of fracture data. The Des Plaines River Channel, the Chicago Sanitary and Ship Canal, the Illinois and Michigan Canal, and the Calumet Sag Channel were all investigated for bedrock exposures. Silurian dolomite outcrops were observed in many areas along these canals and channels, but many of the outcrops appeared to have been disturbed by construction activities. The best undisturbed bedrock exposures were found at or near the Sag Quarries Recreation Area in the Palos Forest Preserve (T37N, R11E, Sections 13 and 14). This area contains abandoned quarries and extensive bedding plane exposures of the Silurian dolomite. The seven outcrops, selected for collection of joint data, are shown on Figure 2-9.

The distribution of the 278 joint orientation measurements, which were collected from the seven outcrops, are shown on Table 2-1 and Figure 2-10. The orientations of the joints were plotted on rose diagrams by grouping the joints into 5-degree sectors and plotting 1-unit length per joint (Figure 2-10). The rose diagram of all the joint measurements (Figure 2-10A) shows three discrete sets of joints: (1) a primary set exhibiting an average azimuth of 132°, (2) a secondary set exhibiting an average azimuth of 47°, and (3) a tertiary set exhibiting an average azimuth of 25°. Although these results closely approximate the results of Nicholas and Healy (1988), ERM-North Central's data show a bi-modal distribution of the primary joint set orientations (Figure 2-10A). The joint set exhibits two prominent orientation nodes, one at 115° to 125° and the other at 130° to 140°.

Because the bi-modal distribution may be a result of construction activities along the Calumet Sag Channel, ERM-North Central separated these data into two groups: measurements collected near the channel (i.e., Outcrops #1 through #5) and measurements collected away from the channel (i.e., Outcrops #6 and #7). Measurement data from each group were tabulated (Table 2-1) and plotted on rose diagrams (Figures 2-10B and 2-10C). The primary joint set measurements taken from outcrops near the channel (Figure 2-10B) show the same bi-modal distribution as the entire data set (Figure 2-10A). However, the primary joint set data collected from the outcrops away from the channel form a single node at 130° to 140° (Figure 2-10C). This suggests that joints exhibiting an orientation of 115° to 125° are only found along the Calumet Sag Channel and, thus, may be an artifact of blasting and construction along the channel and not representative of natural conditions.

The joint orientation data from outcrops away from the channel (Figure 2-10C) are the least likely to have been affected by man-made causes and, thus, are considered the most representative of regional vertical joint orientation patterns. These data suggest the presence of: (1) a primary joint set with an average azimuth of 135°, (2) a secondary joint set oriented at right angles to the primary joint set with an average azimuth of 45°, and (3) a minor tertiary joint set with an average azimuth of 20°. These results are very similar to the vertical joint orientation results reported by Nicholas and Healy (1988).

Because no information regarding the spacing and width of the vertical joints was found in the published literature, ERM-North Central collected these measurements from the seven outcrops described above. The width (or aperture) of the primary and secondary joints varies from tightly closed to approximately 4 inches. The exposed joints are generally wider than the unexposed joints, due to weathering. The spacing ranges from 0.5 to 36 inches and averages approximately 12 inches for the primary joints and from 8 to 24 inches and averages approximately 14 inches for the secondary joints. The length and depth of the joints could not be accurately discerned because of limited bedrock exposure. Where present, the tertiary joints are prominent and laterally extensive, but they were infrequently observed.

According to Nicholas and Healy (1988), horizontal joints along bedding planes are evident in outcrops and from interpretation of borehole geophysical logs from borings drilled at the low-level radioactive waste disposal site. Outcrops along the northern side of the Des Plaines River Valley display prominent horizontal joints, hundreds of feet long. Many of the joints are weathered, and some are several inches wide. Correlation of horizonal joints between borings at the low-level radioactive waste disposal site is excellent, suggesting the joints are continuous for at least 1,600 feet in the subsurface (Nicholas and Healy, 1988). The apertures of subsurface horizonal joints were measured to be as wide as 2 feet. There is also evidence that many horizontal joints have been infilled with sediment ranging in size from clay to sand.

Nicholas and Healy (1988) have classified all horizontal joints into two groups, subregional and regional. Joints that are areally extensive are considered regional joints; whereas joints that are located in bedrock highs and are truncated at the bedrock surface are classified as subregional joints. Subregional joints are more commonly filled with glacial sediment than regional joints. Based on their interpretation of borehole geophysical logs, Nicholas and Healy (1988) have identified major regional joints at elevations of approximately 415, 440, 525, 550, and 565 feet above sea level.

Based on the geological data collected by the IEPA and its contractors, the bedrock surface below the Lenz Oil site occurs at elevations ranging from approximately 582 to 597 feet above mean sea level. This corresponds to approximately 15 feet of bedrock in which horizontal joints would be discontinuous. Therefore, subregional joints are expected to be encountered at elevations above approximately 582 feet, and regional joints are expected below that elevation. The uppermost regional joint reported by Nicholas and Healy (1988) occurred at an elevation of 565 feet, which may be encountered in some of the deep monitoring well borings drilled during Phase I, Task 2 of the Lenz Oil RI/FS.

2.8 Hydrogeology

The regional hydrogeology of the area around the Lenz Oil site has been described by a number of authors, including Zeizel and others (1962), Walker (1964), Kraatz (1964), Gibb (1965), Sherman (1968), Smith (1946), Storm (1946), Olimpoi (1984), and Nicholas and Healy (1988). The regional hydrogeological information presented in this section is a summary of these previous reports. The hydrostratigraphic units used in this report are those of Zeizel and others (1962). Hydrostratigraphic units are geologic units, which on the basis of character, origin, stratigraphic position, and water-bearing properties, act as distinct hydraulic systems. From top to bottom, the hydrostratigraphic units defined in the vicinity of the Lenz Oil site are: (1) glacial drift aquifers, (2) the Silurian dolomite aquifer, (3) the Maquoketa Formation aquiclude, (4) the Cambrian-Ordovician aquifer, (5) the Eau Claire Formation aquiclude, and (6) the Mt. Simon aquifer.

The glacial drift and Silurian dolomite aquifers are hydraulically separated from the underlying Cambrian-Ordovician aquifer by the relatively impermeable shales of the intervening Maquoketa Formation. The Cambrian-Ordovician aquifer is further separated from the deeper Mt. Simon aquifer by the intervening impermeable beds of the Eau Claire Formation. A review of well logs from private wells, located within a two-mile radius of the Lenz Oil site, has shown that the Cambrian-Ordovician and the Mt. Simon aquifers are not utilized within the vicinity of the site. The Cambrian-Ordovician and the Mt. Simon aquifers are not considered pertinent to this investigation because of their lack of a receptor population and because they are isolated from the shallow glacial drift and Silurian dolomite aquifers by up to 200 feet of Maquoketa shales.

The aquifers pertinent to the investigation of the Lenz Oil site are the shallow glacial drift and the Silurian dolomite aquifers. The glacial drift aquifers consist of relatively clean, coarse-texture deposits of sand and gravel that occur erratically throughout the glacial drift. Three categories of glacial drift aquifers are recognized in DuPage County: (1) surficial, (2) interbedded, and (3) basal. Surficial glacial drift aquifers appear just below the land surface and consist of sand and gravel deposits of glacial outwash origin. These deposits are generally concentrated in the valleys of the major drainageways in the area. Because these deposits are not laterally extensive, few producing wells are completed in surficial glacial drift aquifers.

Interbedded glacial drift aquifers are deposits of sand and gravel, which occur as lenticular or sheet-like deposits, erratically distributed throughout the glacial drift. The sand and gravel beds are generally interbedded with fine-grained glacial till. Although numerous, these interbedded sand and gravel deposits are generally too thin and/or too discontinuous to yield producible volumes of water. The basal glacial drift aquifers consist of sand and gravel deposits at the base of the glacial drift, directly above the Silurian dolomite. These deposits are also extremely variable in terms of thickness and lateral continuity. Although the basal drift aquifers have relatively high permeabilities and produce sufficient volumes of water, they are generally bypassed in favor of completing the well in the underlying dolomite. Although glacial drift aquifers exceeding 40 feet in thickness are present within a two-mile radius of the Lenz Oil site, a review of private well logs in that area has demonstrated that few private drinking water wells are completed in the glacial drift aquifers.

The Silurian dolomite aquifer include rocks of the Niagaran and Alexandrian series. The depth to the top of the Silurian dolomite aquifer (and consequently the thickness of the Silurian dolomite aquifer) varies widely over short distances because of the irregular nature of the bedrock surface. According to an aquifer thickness map by Zeizel and others (1962), the thickness of the Silurian dolomite aquifer is between 150 and 200 feet thick below the Lenz Oil site.

Because the Silurian dolomite aquifer has a crystalline matrix rather than a granular matrix, ground water is primarily stored in secondary openings in the dolomite and moves through a complex network of these secondary openings. The primary porosity of the dolomite (i.e., microscopic joints and small pore spaces in the crystalline matrix of the dolomite) is extremely low and is considered insignificant in terms of ground water flow in this aquifer (Zeizel and others, 1962; Nicholas and Healy, 1988). However, primary porosity may represent a relatively large portion of the storage capacity of the aquifer. Most of the porosity and permeability in the Silurian dolomite aquifer has a secondary origin (i.e, it was formed after the deposition and consolidation of the rock). The most numerous types of secondary openings are joints and fractures that were produced in the dolomite by deformation forces and later enlarged by dissolution (Zeizel and others, 1962). According to Nicholas and Healy (1988), most ground water flow in the dolomite occurs in large joints, especially horizontal joints. However, the total void space represented by these fractures is relatively small compared with the total volume of the rock unit.

Both Nicholas and Healy (1988) and Zeizel and others (1962) report that the weathered zone at the top of the Silurian dolomite and the uppermost horizontal joints within the dolomite are the major conduits for ground water flow in the aquifer. Joints that have been enlarged by solution activity form the best conduits for migration of ground water. Surface and subsurface investigations of the dolomite show that, in general, enlargement of joints by solution activity has been greatest in the upper portion of the bedrock. Consequently, most wells in the vicinity of the Lenz Oil site are completed in the upper 60 feet of the Silurian dolomite aquifer. Below this depth, the unit has much less secondary porosity and a significantly reduced transmissivity. According to Zeizel and others (1962), the Silurian dolomite aquifer has an extensive network of interconnected joints, fractures, and solution cavities. The basis for this conclusion is: (1) the reliability of the dolomite as a source of ground water, (2) the high yields of wells drilled into the dolomite, and (3) the relatively uniform piezometric surface of shallow ground water in the dolomite. Nicholas and Healy (1988) determined that horizontal joints below an elevation of approximately 570 feet form a regional ground water flow system that extends throughout the Palos Forest Preserve, which is located across the Des Plaines River Valley from the site. It is likely that the same set of horizontal joints extends below the Des Plaines River Valley and underlies the Lenz Oil site.

Vertical joints in the Silurian dolomite aquifer result in an areal anisotropic transmissivity in the aquifer. This conclusion was drawn by Nicholas and Healy (1988) after interpreting aquifer test data from a ground water study at the Argonne National Laboratory site by using the Papadopulos (1965) solution for anisotropic transmissivity. However, Nicholas and Healy (1988) further concluded that, because the location of individual vertical joints and joint sets was not known for their study area, the effect of vertical joints on ground water flow could not be assessed.

Stratigraphic and water level data collected during previous investigations of the Lenz Oil site show that the aquifer immediately below the site is composed of unconsolidated sand and gravel deposits of alluvial origin and Silurian dolomite. These two units are hydraulically interconnected via the intervening zone of weathered bedrock and a network of interconnected vertical and horizontal joints.

The aquifer is unconfined, and flow is controlled principally by topography. Topographic highs are usually areas of ground water recharge; and conversely, topographic lows are usually areas of ground water discharge. Water level data collected by Nicholas and Healy (1988) from the Palos Forest Preserve clearly demonstrate that ground water flows from the upland areas toward the Des Plaines River Valley. Static water level data from geologic logs of private wells within a two-mile radius of the Lenz Oil site further support the conclusion that ground water flow in the Silurian dolomite aquifer is principally controlled by topography.

Water level measurements were collected from the network of monitoring wells at the Lenz Oil site by the Illinois Environmental Protection Agency (IEPA) on June 4, 1986, November 17, 1986, January 6, 1988, and March 2, 1988 (Table 2-2). Of these four rounds of water level measurements, three rounds show that shallow ground water flows toward the southeast and northeast, and that monitoring wells in cluster G-101 are upgradient of the site. An anomalously high water level was recorded for cluster G-105 during the January 6, 1988 round of measurements, which indicated that ground water was mounded around location G-105, and flow was radial from the site. If the water level measurement from G-105 is eliminated from the January 6, 1988 data set, the resulting ground water flow direction is consistent with the other rounds of water level measurements.

ERM-North Central collected three rounds of water level measurements from the Lenz Oil monitoring wells on January 29, 1991, February 26, 1991, and March 20, 1991, respectively, these measurements, which are shown in Table 2-2, indicate that shallow ground water flow is toward the south, southeast, east, and northeast. As illustrated on the water table maps (Figures 2-9, 2-10, and 2-11) developed from the monthly water level data, the direction of ground water flow appears to vary significantly over time. Some of the variability may be related to changes in the set of monitoring wells from which data were collected. For example, because the shallow well at G-104 was frozen during the January 29, 1991 round of measurements, data from the deep well, which is only 5 feet deeper than the shallow well, was plotted with the shallow wells. Furthermore, water level measurements from three new wells (i.e., MW-01S, MW-04S, and MW-05S) were added to the March data set. Although the water level elevation data sets are not the same, each set indicates shallow ground water below the site flows to the south, southeast, east, and northeast. Final interpretations regarding water flow will be reserved until several rounds of water level measurements are collected from the complete Phase I, Task 2 monitoring well network.

Based on the regional topography and hydrogeology, the uplands northwest of the site are the primary recharge areas for shallow ground water below the site, and the Des Plaines River is probably the discharge area for shallow ground water flowing below the site. The horizontal gradient in the shallow aquifer, as measured from monitoring wells at the Lenz Oil site, is approximately 0.003. The potentiometric head measured in monitoring wells that straddle the water table is 0.17 to 2.62 feet higher than the head measured in monitoring wells screened several feet below the water table. These measurements indicate a downward vertical gradient of 0.013 to 0.444 and a potential for recharge from the water table to the base of the aquifer. Although it is likely that seasonal variations in the stage of the Des Plaines River affects the ground water flow rate below the Lenz Oil site, this has not yet been confirmed by seasonal water level measurements.

Nicholas and Shapiro (1986) conducted a preliminary hydraulic characterization of the Silurian dolomite aquifer beneath the low-level radioactive waste disposal site by using single-hole packer tests at 10-foot intervals in boreholes at their site. To characterize the hydraulic conductivity of the solution-enlarged joint sets, they assumed that each joint is hydraulically analogous to an infinite confined aquifer that is bounded above and below by an impervious dolomite matrix. The uppermost joint set did not fit this assumption because it is hydraulically interconnected with the weathered bedrock zone at the drift-dolomite contact and thus responded like an unconfined aquifer. Estimated values of the hydraulic conductivity for the joint sets range from 2.0×10^{-3} to 1.0×10^{-2} feet/second. The hydraulic conductivity of dolomite contains secondary porosity features, which are less well connected than the joint sets, is approximately 3.0×10^{-5} feet/second. The hydraulic conductivity of the dolomite matrix, if it contained only primary porosity, is estimated to be considerably less than 3.0×10^{-5} feet/second.

3.0 SITE BACKGROUND

3.1 History of Ownership

The following is a chronological summary of the ownership history of the Lenz Oil Service, Inc. property, located at Route 1, Lemont, Illinois 60439. The legal description of this property is presented in Section 2.2 of this Technical Memorandum.

- **1960 to 1980**
  Owner: Lenz Oil Service, Inc.
  President: Winston Lenz

- **1980 - present**
  Owner: Lenz Oil Service, Inc.
  President: Charles Russell

3.2 History of Waste Transport, Storage, and Disposal

Winston Lenz of Hinsdale, Illinois began operating Lenz Oil Service, Inc. in April 1961. The business originally collected waste oils from local service stations and other small businesses; temporarily stored the waste oils in tanks located at the Lenz Oil Service, Inc. facility; and then shipped the waste oils to local recycling facilities. It also supplied oils and construction materials for roadwork projects. In 1980, Charles Russell purchased the Lenz Oil Service, Inc. stock and took over the operation of the facility. Sometime prior to December 1980, the waste oil collection, storage, and transport operation was expanded to include waste solvents. This portion of the operation involved: (1) collecting spent solvents from local commercial and industrial facilities, (2) transporting the waste solvents in tank trucks licensed for hauling special waste, (3) temporarily storing the solvents in permanent tanks at the Lenz Oil Service, Inc. facility, and (4) transporting the waste solvents to a local recycling facility.

The waste transport, storage, and disposal activities conducted at the Lenz Oil Service, Inc. facility are not documented in regulatory files for the time period between April 1961 and October 1980. Based on the aerial photograph analysis, which is described in further detail in Section 3.4, the on-site storage capacity for waste oils and spent solvents expanded considerably from 1961 through 1981. No further expansion occurred after 1981. Records describing the types and quantities of waste oils and solvents handled by the Lenz Oil Service, Inc. facility during 1980 and 1981, which are probably the peak years of operation for the facility, are summarized on Table 3-1. Non-waste materials that were stored at the site during 1980 and 1981 are summarized on Table 3-2. These records document the relatively small volume of waste solvents handled by Lenz Oil Service, Inc. compared to the volume of waste oils handled by the facility. Although the waste oils included transformer oil (which may have contained PCBs), the oils were not tested or segregated at the Lenz Oil facility. These mixed waste oils were shipped via tanker truck to a local waste oil recycler on a weekly basis. Spent solvents were allegedly tested by the generator prior to collection by Lenz Oil Service, Inc. According to a letter from Charles Russell to IEPA, the spent solvents were shipped out to a recycler as soon as they were received. However, it is unclear whether or not the solvents were temporarily stored at the Lenz Oil Service, Inc. facility and whether or not the solvents were mixed.

IEPA began keeping records of the waste stream handled at the Lenz Oil Service, Inc. facility sometime after 1983. The 1984 waste stream of the Lenz Oil Service, Inc. facility is summarized on Table 3-3. This summary, which is based on an IEPA report, suggests that the types of wastes accepted by the Lenz Oil Service, Inc. facility were the same as those accepted in 1980 and 1981, but that the volume of waste handled in 1984 was approximately 50 percent less than the volume handled in 1980 and 1981. IEPA used waste manifest records to calculate the approximate total volume of waste transported to and from the Lenz Oil Service, Inc. facility between the time that manifest records were first required and May 24, 1986, which is after the Lenz Oil Service, Inc. facility ceased operation. A summary of the total waste stream for the Lenz Oil Site during that period is presented on Table 3-4.

According to the IEPA (1985), Lenz Oil Service, Inc. ceased to operate in November 1985. In April 1986, Charles Russell filed for bankruptcy and abandoned the facility completely (IEPA, 1985). At the time the facility was abandoned, the following features were located on the site: a wood-frame office building, a concrete-block maintenance building, a concrete parking shed, a metal structure, two monitoring wells (OW-1 and OW-2), a number of aboveground and underground tanks, several tank trucks, a former surface impoundment area, and a cinder pile (Figure 3-1). A fence with two access gates along Jeans Road enclosed the active portion of the facility. The following storage vessels were located at the Lenz Oil Service, Inc. facility in early 1985:

- Three high-capacity (30,000- to 80,000-gallon) underground, unlined, concrete storage tanks.
- Fourteen (14) low- to moderate-capacity aboveground or partially buried steel tanks.
- Six low-capacity underground steel tanks.
- Nine tanker trucks with a total capacity of over 30,000 gallons.
- A drum storage area containing approximately 200 drums.
- Three surface impoundments constructed of porous cinder-type material that were used for hazardous waste storage.

Beginning in 1980, Lenz Oil Service, Inc. attempted to acquire the necessary permits required to operate a waste oil and spent solvent storage and transfer facility in the State of Illinois. In response to an IEPA inspection of the facility on October 2, 1980, and the subsequent notification that the facility was operating without the required permits, Lenz Oil Service, Inc. applied for a permit to operate a waste management site at their facility. The IEPA issued the necessary permit to operate a storage and transfer facility for waste oils and solvents on July 5, 1981. Because of reported ground water contamination at the site, special conditions in the IEPA permit required Lenz Oil Service, Inc. to assess the extent of ground water contamination caused by oils and grease at the site and submit a plan to: (1) limit further degradation, and (2) upgrade the quality of ground water in the area (IEPA, 1981). Although Lenz Oil Service, Inc. installed two monitoring wells on the site, there is no evidence indicating that a ground water contamination study was conducted or that ground water remediation activities were undertaken.

On November 19, 1980, Lenz Oil Service, Inc. submitted an application to the USEPA for a RCRA Part A Permit to store hazardous material in tanks at their facility. In December 1982, USEPA issued a Consent Agreement and Compliance Order stating that Lenz Oil Service, Inc. was operating their facility without an interim status permit. The site continued to operate and was required to obtain the appropriate hazardous waste permits. During November of 1984, Lenz Oil quit accepting hazardous waste (i.e., spent solvents); and on November 13, 1984, they requested the withdrawal of the facility's Part A Permit, stating that the site no longer handled hazardous waste. On February 5, 1985, Noble and Associates, on behalf of Lenz Oil Service, Inc., submitted a closure plan for that portion of the facility (Tank #1) that handled hazardous waste. IEPA confirmed that solvents were no longer being handled by the facility on February 6, 1985; and on July 22, 1985, IEPA approved a partial closure plan for Tank #1. However, the tank was not closed before the facility ceased operations.

After numerous permit violations involving: (1) manifest infractions, (2) inadequate waste handling practices, and (3) reported releases of hazardous waste to local ground water and surface water systems, the IEPA referred a law suit to the Illinois Attorney General's Office alleging mismanagement of hazardous waste at the Lenz Oil Service, Inc. facility. In May 1985, a complaint was filed in the Circuit Court of DuPage County, Illinois against Lenz Oil Service, Inc. and Charles Russell. An Order, agreed upon by the parties, was entered by the Circuit Court in May 1985. The Order required Lenz Oil Service, Inc. and Charles Russell to initiate immediate clean-up actions and to file a closure and compliance plan. After failing to carry out major portions of the court order, Lenz Oil Service, Inc. ceased operations; and its owner, Charles Russell, filed for bankruptcy in April 1986.

3.3 History of Response Actions

In response to the November 19, 1980 application to develop and operate a waste management facility at the Lenz Oil Service, Inc. site, IEPA outlined several tasks that Lenz Oil Service, Inc. had to complete prior to the issuance of the requested operating permit. Several of these tasks were conducted by Soil Testing Services, Inc. (STS), on behalf of Lenz Oil Service, Inc. The tasks conducted by STS included the preparation of a contingency plan, leak testing of the three high-capacity underground storage tanks, installation of two monitoring wells (OW-1 and OW-2), collection of ground water samples from the monitoring wells, and preparation of a plan to limit further ground water degradation resulting from the operation of the Lenz Oil Service, Inc. facility.

Ground water samples were collected from monitoring wells OW-1 and OW-2 on April 8, 1981, October 23, 1981, and September 22, 1982. Oil and grease were detected in ground water samples collected from both monitoring wells during each round of sampling. The downgradient monitoring well (OW-2) exhibited the highest concentration of oil and grease each time. IEPA records indicate that both monitoring wells were sampled on a quarterly basis and that the samples were analyzed for a selected set of organic and inorganic constituents. Lenz Oil Service, Inc. made no additional attempt beyond installing and sampling OW-1 and OW-2, to assess the extent of ground water contamination at their facility or to initiate a program to upgrade the ground water quality in the vicinity of the site, as required under the operating permit. However, in an attempt to prevent future degradation of the ground water quality by the Lenz Oil Service, Inc. operation, Lenz Oil paved the area where waste oils and solvents were transferred between tank trucks and underground storage tanks. This measure was approved by IEPA and was completed by Lenz Oil Service, Inc. during the first quarter of 1982.

In response to reports that Lenz Oil Service, Inc. was discharging waste material from surface impoundments at their facility to the drainage ditch north of their facility, IEPA notified Lenz Oil Service, Inc. on February 7, 1985, that these discharges were an apparent violation of Illinois statues. Lenz Oil Service, Inc. informed IEPA that the company was in the process of pumping the liquid from the impoundments into on-site storage tanks where it would be held until proper disposal could be arranged. The material in the surface impoundment was reportedly crankcase oil with 10 to 20 percent water and was allegedly pumped into the impoundments as an emergency measure following the malfunction of oil lines at the facility. IEPA collected samples from the surface impoundment and the drainage ditch north of the facility. The analysis of these samples revealed elevated concentrations of organic compounds and metals in both samples. Pursuant to an anonymous complaint on April 24, 1985, IEPA inspected the Lenz Oil Service, Inc. site again and noted the presence of a milky white substance with a petroleum odor being discharged from the surface impoundments to the drainage ditch north of the site.

Later in April 1985, IEPA referred a law suit to the Illinois Attorney General's Office alleging illegal operation of surface impoundments by Lenz Oil Service, Inc. The parties quickly reached an agreement order; and on May 30, 1985, an immediate clean-up plan was filed by Hamman & Benn on behalf of Lenz Oil Service, Inc. Concurrent with the submittal of the immediate clean-up plan, Lenz Oil Service, Inc.: (1) pumped all contaminated liquids on the site into tanks for storage until approval for final disposal of the material was granted by IEPA, (2) recontoured the surface of the site to halt the spreading of potentially hazardous liquid, and (3) blocked the flow of surface runoff to the drainage ditch north of the site. Arrangements were also made to sample the soil in the surface impoundments and the ground water in the on-site wells. Changes in operational procedures were also made to ensure that the use of the surface impoundments as an emergency containment area was no longer necessary. A further clean-up plan was filed by Hamman & Benn on behalf of Lenz Oil Service, Inc. on June 13, 1985.

In November 1985, the IEPA inspected the Lenz Oil Service, Inc. facility and observed that the facility was in general disarray and appeared abandoned. During their inspection, the IEPA was informed by Lenz Oil Service, Inc. personnel that the company was preparing to file for bankruptcy later in the month. According to the inspection report, 25 percent of the facility grounds were covered with standing oily water. Storage tanks were filled to the overflow point, and it did not appear that the facility had adequate spill or leak containment structures. After confirming the operating status of the facility and assessing the hazardous nature of the site, the IEPA prepared a Record of Decision (ROD) for the Remedial Action required at the Lenz Oil Service, Inc. site. The ROD was filed January 17, 1986 and amended January 15, 1987. The amended ROD stated that the Remedial Action activities at the Lenz Oil Service, Inc. site would be conducted in the following three phases: Phase I - Remedial Investigation, Phase II - Emergency Remedial Action, and Phase III - Site Remediation.

Phase I Remedial Investigation activities were conducted by IEPA and its contractors (Wehran Engineering Corp. and Petrochem Services, Inc.) between April 15, 1986 and November 30, 1986. The following tasks were completed during the Phase I Remedial Investigation:

- o On-site drums, tanks, and tank trucks were inventoried, sampled, and secured. Sample analyses indicated that the contents of the drums were predominantly oils, solvents, and tar waste and that the contents of the tanks and tank trucks were oils and solvents.

- The site was surveyed with a magnetometer and a metal detector to identify buried objects such as piping systems and drums. A few small anomalies were identified, but the precise dimensions of the anomalies could not be determined and the buried objects were not identified.

- Numerous surface and subsurface soil samples were collected and analyzed for organic compounds. Organic contaminants including solvents and petroleum-based products were detected in the soils at concentrations up to 2,000 ppm.

- Eleven (11) monitoring wells, arranged in five-well clusters, were installed to evaluate the hydrogeology of the site and to assess the ground water quality at several intervals, ranging from 8 to 38 feet below ground level. Ground water samples contained various volatile organic compounds, semivolatile organic compounds, and some PCBs.

- Potentially explosive storage tanks were blanketed with nitrogen, all tank penetrations were sealed, berms were constructed to reduce off-site drainage, and a local contractor was hired to conduct weekly inspections of the site to ensure that these emergency measures were maintained.

Based on the results of the Phase I investigation, the IEPA defined the scope of the Emergency Remedial Actions to be conducted under Phase II of the ROD. According to the ROD addendum, the scope of the proposed Emergency Remedial Action activities was not intended to result in complete restoration of the site. The activities were instituted to reduce the gross immediate environmental hazards presented by the liquids, drummed waste, and leaking underground storage tanks at the site and, therefore, would result in remediation of approximately 100 percent of the on-site liquids, 100 percent of the drummed waste, and 60 percent of the contaminants in the soil.

During Phase II, a mobile rotary kiln incinerator operated by ENSCO was set up at the site to incinerate on-site liquids, drummed waste, and contaminated soil. According to Janssen (1988), the following tasks were conducted as part of the Phase II Emergency Remedial Action Program:

- All drum, tank, and tank truck contents were incinerated.

- The drums were shredded and incinerated, and the tanks and tank trucks were emptied, decontaminated, and transported off site.

- All aboveground and underground structures were removed.

- Soil in the vicinity of the underground storage tank farms and buried drums was excavated to a depth of 9 to 11 feet (i.e., the top of bedrock) and incinerated (see main excavation area, Figure 3-3).

- Hot spots in the area of the former surface impoundments were excavated and incinerated.

- In April 1988, municipal water was made available to residences on Jeans Road and all residences formally using private wells in the immediate vicinity of the site.

A total of 21,000 tons of contaminated soil was excavated and incinerated, and the ash was returned to the excavation area (Figure 3-3). The quantities of soil removed from the main excavation area and from hot spots outside the main excavation area are unknown. Excavation of contaminated soil was reportedly carried out until bedrock was encountered in the vertical direction and until the native soil lateral to the excavation area was found to contain less than 5 ppm total volatile organic compounds. This was achieved in most places at a depth of 9 to 11 feet below ground surface, which corresponds with the top of bedrock. During remediation of soil in the main excavation area, the IEPA had a 10-mil (0.0001-inch) layer of pond-liner-grade visqueen installed above the bedrock, at the base of the excavation pit. Visqueen was installed manually, and overlapping layers of the visqueen were solvent welded. The liner covers the entire main excavation area, including the floor, sidewalls, and approximately one (1) foot of the level ground surrounding the excavated area. Incinerator ash was then placed above the visqueen as backfill material. The hot spot excavation areas were not lined with visqueen, but were backfilled with clean material rather than incinerator ash. Information concerning the soil excavation, liner installation and incineration activities was gathered from Janssen (1988), Janssen (1990), IEPA (1990) and Gardenour (1990).

According to the amended ROD, IEPA had intended to construct a slurry wall dividing and segregating the highly contaminated portion of the Lenz Oil Service, Inc. facility (the southwest one-half of the operating site) from the less contaminated (northeast) portion of the site. There is no indication in the Phase II records that this slurry wall was constructed. The amended ROD also calls for the design and installation of a permanent cap over the portion of the Lenz Oil Service, Inc. site that met clean-up objectives. Other than covering the site with top soil and planting grass, there is no indication that a permanent cap was constructed at the site (Figure 3-3). Phase II activities were completed in July 1988.

Phase III of the amended IEPA ROD was to be conducted simultaneously with Phase II and was to include placing the Lenz Oil Service, Inc. site on the CERCLIS list and conducting the required screening activities to score the site for the National Priorities List (NPL). Assuming the site scored high enough to be placed on the NPL, an RI/FS would be conducted at the site, an appropriate remedy would be designed and constructed, and the IEPA would petition the USEPA for the State's cost-share reimbursement of non-federal expenditures.

On October 23, 1984, the IEPA identified the Lenz Oil Service, Inc. site as a potential hazardous waste site to the USEPA in the form of a Preliminary Assessment (USEPA, 1984). A site inspection was conducted by Wehran Engineering, and a potential hazardous waste site inspection report was submitted on August 14, 1987. On October 2, 1987, a Hazard Ranking Score (HRS) report for the Lenz Oil Service, Inc. site was filed with USEPA Region V. The USEPA proposed that the Lenz Oil site be included on the National Priorities List (NPL) in June 1988 with a HRS score of 42.33 (USEPA, 1987). The score was based on conditions at the facility that existed prior to the IEPA's Emergency Remedial Activities. The NPL listing became final in September 1989. On November 28, 1989, the USEPA and the Lenz Oil Service, Inc. Participating Respondents signed an Administrative Order by Consent to perform an RI/FS of the Lenz Oil Service, Inc. site. In accordance with the Consent Order, ERM-North Central, on behalf of the Lenz Oil Service, Inc. Participating Respondents, submitted an RI/FS Work Plan for the Lenz Oil Service, Inc. site to the USEPA on January 22, 1990. The Work Plan was approved by USEPA Region V and the IEPA on December 18, 1990.

On March 30, 1988, the Lenz Oil Service, Inc. Participating Respondents entered into a judicial Consent Decree with the IEPA and the State of Illinois that constitutes a full settlement of certain current and future site clean-up costs (DuPage County Circuit Court, 1988). The Consent Decree provides that in the event the USEPA requires additional remedial activities at the site, other than ground water remediation, such additional remediation "shall be dealt with by the State."

3.4 Historical Aerial Photograph Analysis

ERM conducted an analysis of historical and current aerial photographs of the Lenz Oil site to better assess the history of operations at the site. All of the aerial photographs of the site available from the U.S. Department of Agriculture were reviewed. These photographs document the physical conditions and the expansion of operations at the Lenz Oil site. Seven black and white photographs representing a period of 34 years (1954-1988) were used as part of this analysis. Photographs from 1954, 1961, 1967, 1971, 1974, 1981, and 1988 were reviewed and interpreted. Table 3-5 provides summary information on the aerial photographs used for analysis.

Topics addressed in the photo analysis include: (1) operations expansion, (2) storage areas, (3) waste disposal areas, and (4) drainage patterns. The results of the analysis are shown on seven annotated figures (Figures 3-4 to 3-10), each representing a interpretation of an aerial photograph.

3.4.1 1954 Aerial Photograph

The 1954 photograph (Figure 3-4) shows the condition of the site prior to the establishment of the Lenz Oil facility. The site was mainly an open field with portions of the east side of the site covered with woods. The vegetation on the east half of the site was a darker shade than the vegetation on the west half of the site. The reason for the variation in vegetation color is unknown.

Two buildings existed at the east corner of the site. The westernmost building may be a residence or former residence; the other is a garage or large shed. A drainage ditch and railroad tracks were adjacent to the northwest boundary of the site. A farm was located to the south, across Jeans Road from the site. The site was bound by State Route 83 to the west and a wooded area (future Corwin Lenz residence) to the east.

3.4.2 1961 Aerial Photograph

Based on changes in site features shown on the 1954 and 1961 photographs, it is clear that Lenz Oil Services, Inc. began operating between 1954 and 1961. By 1961 (Figure 3-5), a maintenance building had been constructed at the south-central portion of the site, and the underground tank farm immediately north of the maintenance building was in place. Aboveground tanks, tankers, and possibly drums were located in an area west of the underground tank farm. Immediately west of this location was a cleared area or a cement pad. At least three tank trucks were parked on the site. The house noted on the 1954 photograph may have been converted to an office building by the time the 1961 photograph was taken.

3.4.3 1967 Aerial Photograph

Between 1961 and 1967 (Figure 3-6), another underground tank farm was constructed north of the underground tank farm noted in the 1961 photograph, and a cluster of aboveground tanks was established west of the underground tank farm. An area of disturbed soil and/or unidentified objects was located to the east of the southern underground tank farm. A parking shed, located in the western portion of the site, was also constructed between 1961 and 1967. The south half of the parking shed was covered with a roof in 1967, but the north half of the shed was not yet covered. A trailer or mobile home was situated just east of the property, and an area of scattered unknown objects was located immediately northeast of the mobile home. Several tank trucks were parked on the site.

3.4.4 1971 Aerial Photograph

Three aboveground tanks were installed around the maintenance building between 1967 and 1971 (Figure 3-7). A metal shed was constructed between the three underground tank farms north of the maintenance building. Another underground tank farm was built immediately west of the aboveground tank farm located on the western portion of the site. The north half of the parking shed was covered by 1971. A surface impoundment, containing liquid, was present for the first time in the 1971 photograph. Two large areas of disturbed ground and/or unidentified objects surrounded the impoundment. Several tank trucks were parked around the site, which may have been partially enclosed with a fence.

3.4.5 1974 Aerial Photograph

Two large cylindrical aboveground tanks were added near the center of the property between 1971 and 1974 (Figure 3-8). A large rectangular aboveground tank was installed north of the cylindrical tanks. Another tank farm was constructed north of this large rectangular aboveground tank. The surface impoundment was still present in 1974 and still contained liquid. Several tank trucks were parked around the site. A mobile home or tank truck was located just east of the site, on the Corwin Lenz property.

3.4.6 1981 Aerial Photograph

Additional aboveground tanks were added to the tank farm north of the cylindrical tanks (Figure 3-9). A small underground tank farm was added east and adjacent to the aboveground tank farm, located east of the parking shed. The surface impoundment noted in previous photographs may have been present in 1981, but it is not clear from the photograph. Because of the apparent absence of water in the area (as shown on the 1981 photograph), this feature may be the previously identified surface impoundment or a cinder pile. Several tank trucks were parked around the site.

3.4.7 1988 Aerial Photograph

It is clear from the 1988 photograph (Figure 3-10) that operations had ceased at the Lenz Oil Service, Inc. facility by that time and that remedial activities had begun. An incinerator and a support area were established on the east side of the site. Approximately 75 percent of the site appeared to have been excavated to various degrees. However, the site's main structures (i.e., the maintenance building, parking shed, and office building) were still present.

4.0 NATURE AND EXTENT OF CONTAMINATION

4.1 Preliminary Conceptual Site Model

A preliminary conceptual site model has been developed for the Lenz Oil site that represents the contaminants present, their routes of migration, and potential receptors (Figure 4-1). The purpose of the conceptual model is to aid in the selection of sampling locations and to help identify and evaluate potential remedial alternatives. Information obtained during the RI activities will be used to fine tune the model.

The model was developed by considering and evaluating: (1) the documented history of activities conducted at the Lenz Oil site, and (2) the data collected during the remedial activities undertaken by IEPA and its contractors (see Section 3.3). Because some remedial activities have already been conducted at the site, this model attempts to reflect both pre- and post-remediation conditions at the site. The following subsections describe each aspect of the conceptual model in further detail.

4.2 Primary Contamination Sources

Four primary sources of contamination were identified at the Lenz Oil site: drums, tanks, tank trucks, and surface impoundments. According to IEPA records, a total of 197 drums, 27 tanks, 8 tank trucks, and 3 surface impoundments were located at the site. Although the contents of some of these sources were sampled and analyzed prior to 1986, a coordinated sampling effort was not conducted until the summer and fall of 1986. The permanent locations of the tank farms and drum storage areas are shown on Figures 3-1 and 3-2. An approximate location of the surface impoundment area is also indicated on these figures; however, the impoundments were allegedly moved several times during the operation of the Lenz Oil facility and were not present during the time the IEPA conducted remedial activities.

ERM-North Central divided the laboratory analytical results for the primary sources into groups representing drums, tanks, tank trucks, and surface impoundments. The analytical results show that the drums, tanks, and tank trucks contained similar types and concentrations of contamination. Because of their similar contaminant characteristics and their proximity to each other, the drums, tanks and tank trucks are considered a single homogenous primary source. As shown in Table 4-1, the drums, tanks, and tank trucks contained elevated concentrations of metals, cyanide, semivolatile organic compounds, volatile organic compounds, and, to a lesser degree, PCB contamination.

The surface impoundment located in the northeastern section of the site was inspected by the IEPA on April 24, 1986 and according to the IEPA inspection report, the contents of the impoundment consisted of a milky white substance with a petroleum odor. ERM-North Central reviewed the limited analytical data describing the contents of this impoundment area; these data indicate elevated concentrations of organics and metals (Table 4-2). Although the contaminant characteristics are similar to those of the drums, tanks, and tank trucks, the surface impoundment will be considered a separate primary source because of its separate location and potential differences in primary release mechanisms.

Because the foregoing primary sources were incinerated by the IEPA in 1986, they have not contributed to further contamination at the site. However, due to poor operating procedures and inadequate housekeeping practices by Lenz Oil Service, Inc., contaminants were released to the on-site soil prior to the IEPA remedial activities. Because the analytical results discussed in this section represent only a small portion of the waste handled by Lenz Oil Service, Inc., these data may not fully describe the types and concentration ranges of contaminants released to the environment.

4.3 Primary Release Mechanisms

The primary release mechanisms of contaminants at the Lenz Oil site include surface water runoff, infiltration, volatile emissions, and transport by dust and other particulate matter (see Figure 4-1). An IEPA site inspection conducted in November 1985 indicated that 25 percent of the facility grounds were covered with standing oily water. Storage tanks were reported to be at the overflow points and did not appear to have adequate spill or leak protection. Also, as noted previously, the contents of the surface impoundment were directly discharged into the drainage ditch on the north side of the facility.

Based on IEPA's records and the characteristics of contaminants in the primary sources, all of the aforementioned primary release mechanisms contributed to the release of contamination. Perhaps the most significant release mechanisms were spillage and leakage from drums, tanks, and tank trucks resulting in subsequent contaminated surface water runoff and infiltration into the area soils.

4.4 Secondary Contamination Sources

Surface and subsurface soils on the Lenz Oil site were sampled and analyzed by the IEPA and its contractors in 1986 (Wehran Engineering, 1987). Although the majority of the soil samples were taken from the northeastern side of the site, samples were collected from various locations and depths across the entire site (Figure 3-2). Insufficient data exist to characterize soil contamination around some of the primary sources, and the analytical results that do exist generally show similar contaminant types and concentration ranges regardless of proximity to individual primary sources areas. Furthermore, the soil samples contained many of the same contaminants detected in the primary sources, but at lower concentrations (Table 4-3). Only a few soil samples contained higher concentrations of contaminants than the primary sources.

As indicated in Section 3.3, approximately 21,000 tons of on-site contaminated soils were excavated and incinerated. The relative quantities of soil removed from the main excavation and areas considered as hot spots are, however, not known. Incinerated ash was used as backfill material in the main excavation areas and, thus, represents another potential secondary source of contamination. Samples of incinerated ash were collected by the IEPA and/or its contractor to evaluate the effectiveness of the incinerator in reducing soil contamination and to document the quality of the ash used to backfill the excavation area. Based on available analytical data, it appears that samples of the ash were analyzed for semivolatile organic compounds and occasionally volatile organic compounds. There is no record of metal analyses for the ash. As indicated in Table 4-4, only a few samples of the ash contained semivolatile or volatile organic contaminants at concentrations above the detection limits. It is unclear whether or not the contaminated ash was further incinerated or if it was used as backfill. Analytical data from "tent samples" show considerable organic contamination (Table 4-5), but the origin and final destination of the "tent sample" material is unknown.

The analytical results for the incinerated ash are a measure of the post-remediation site conditions in the main excavation area. Unfortunately, because the ash was analyzed for an incomplete set of analytical parameters, the actual quality of the backfilled ash is unknown. While the analytical results for the surface and subsurface soils are a measure of the pre-remedial site conditions, only soils exhibiting a total volatile organic concentration greater than 5 ppm were excavated and incinerated. Thus, some contaminated soil remained at the site after remediation. The IEPA is currently collecting soil samples from the incinerated ash backfill, the native soil around the main excavation area, and the soil around the former surface impoundment area. Analytical results from these soil samples will be used to re-evaluate the contaminant characteristics of the secondary sources.

4.5 Secondary Release Mechanisms

The release mechanisms for the secondary sources are similar to those identified for the primary sources. The significant mechanisms in this case are infiltration/percolation, surface water runoff, and dust and other particulate emissions. Infiltration/percolation releases contaminants in the secondary sources (i.e., on-site soil and/or incinerated ash) directly to the ground water migration pathway. Surface water runoff releases contaminants found in the surface soil and incinerated ash directly to the surface water migration pathway and indirectly (i.e., through infiltration/percolation as well) to the ground water migration pathway. Surface soil contaminants may also be released to the air migration route via dust or other particulate emissions.

Surface water runoff from the site appears to drain in a westerly direction along a well-defined ditch on the north side of the facility. The drainage ditch directs flow towards the Des Plaines River. Judging from the proximity of the river, the length of overland flow is estimated as 1,000 to 1,500 feet. Because of the generally flat terrain on and around the site, ponding during rainfall events may occur, resulting in a natural attenuation of contaminants reaching the Des Plaines River. Conversely, areas in which ponding occurs may act as short-term detention ponds for conservative contaminants. During rainfall events, these areas may result in a "first flush" of contamination in the runoff ultimately discharging into the Des Plaines River.

4.6 Migration Pathways

The ground water and surface water pathways are the most likely routes of migration for contamination at the Lenz Oil site. Significant airborne contaminant migration is not considered likely since all of the primary contaminant sources have been eliminated, which leaves dust and other particulates generated from secondary contaminant sources as the only potential airborne material. Any direct contact and fire/explosion risks were probably eliminated by the IEPA remediation of on-site soils. However, because not all of the on-site soils were remediated and the composition of the backfill is unknown, secondary sources of contamination may still release contamination to the air and pose a minor risk of direct contact.

The local ground water system is the primary migration pathway from the Lenz Oil site. Samples collected from local monitoring wells and residential wells have documented the presence of volatile organics, semivolatile organic, metals, and PCBs in the ground water system. The PCBs were only detected in on-site monitoring wells near the source area. Table 4-6 shows the private wells sampled by IEPA, their locations, sampling dates, and the parameters analyzed. The types of contaminants and ranges of concentrations detected in ground water samples from private and monitoring wells are indicated in Tables 4-7 and 4-8, respectively.

The highest concentration of ground water contamination is centered around the G-105 monitoring well cluster, which is located between the former northern tank farm and drum storage area (Figure 4-2). Lesser amounts of contamination were detected to the south and southeast, in well clusters G-102, G-104, and G-106. Several common laboratory contaminants, were detected in the upgradient well cluster, G-101. Because all but one of these contaminants were detected in the laboratory method blank, the upgradient samples are considered free of site-related contamination.

The distribution of contaminants in ground water suggests the presence of a southeastward migrating plume containing a variety of volatile organics, semivolatile organics, and metals. The wells furthest from the site containing ground water contamination are G-102L, G102D, and the Williams Bait Shop Residential Well. Low concentrations of several volatile organic compounds and one semivolatile organic compound have been detected in all of these wells.

Based on the IEPA ground water data from July 29, 1986 and June 30, 1987, the plume is present at 30.8 feet below the ground surface and extends at least 60 feet downgradient of the site.

Surface water and sediment in the drainage ditch adjacent to the Lenz Oil site are also potential pathways of contaminant migration from the site. The drainage ditch flows into the Des Plaines River southwest of the site. Based on our review of available site data, the potential effects of contamination from the Lenz Oil site on the water and sediment in the drainage ditch have not been previously evaluated.

4.7 Potential Receptors

One of the objectives of the Lenz Oil Service, Inc. RI, as stated in the Work Plan, is to identify potential receptors of contamination migrating from the site. In an initial evaluation of potential receptors, conducted prior to the preparation of the Work Plan, the following groups of potential receptors were identified: ground water and surface water users, wetlands, and endangered/threatened species. Subsequently, fish in the Des Plaines River have been added to this list of potential receptors. These groups of potential receptors have been evaluated in greater detail as part of Phase I, Task 1, and the results of that evaluation are discussed in the following subsections. This information will be used to reevaluate the preliminary conceptual site model and help direct sampling efforts toward the migration pathways most likely to affect the identified potential receptors. Receptor data will also become part of the Lenz Oil site Risk Assessment.

4.7.1. Ground Water Users

According to the HRS package for the Lenz Oil site (USEPA, 1987), ground water users are the primary receptors of concern. The USEPA estimates that 11,335 people use drinking water obtained from wells located within three miles of the Lenz Oil site (USEPA, 1987). All of the wells allegedly draw water from the Silurian dolomite aquifer, and supposedly no alternative water supplies (i.e., municipal water obtained outside the three-mile radius) exist in the area (USEPA, 1987). Because the HRS model, by which these estimates were derived, does not take into account ground water flow direction, ground water divides/discharge areas, or remedial activities, the USEPA estimate is not an accurate indication of the number of ground water users potentially receiving contamination from the site.

Accordingly, ERM-North Central has conducted a ground water usage survey for the area within two miles of the Lenz Oil site. The survey included a review of all of the water well records available from the Illinois Geological Survey and the Illinois State Water Survey for the area of interest as well as water usage records for local water systems. These ground water usage data were then analyzed in terms of the actual hydrogeologic system operating at the Lenz Oil site. The purpose of the water usage survey was to determine: (1) the usable aquifers in the area; (2) the number, type, and location of wells in the vicinity of the site; (3) the construction (i.e., depth, casing, screen materials, and screened intervals) of the wells in the area; (4) the number and location of wells that pump water from the potentially contaminated aquifer; and (5) the wells that are suitable candidates for sampling during Phase II of the RI.

A total of 310 residential, commercial, and industrial wells were identified from the well construction records as being located within approximately two miles of the Lenz Oil site. To facilitate an evaluation of these wells, each well was placed into one of the following three categories: (1) individual wells within one mile of the site, (2) individual wells between one and two miles of the site, and (3) groups of wells within two miles of the site. The third category was necessary because high well density in some areas made it impractical to accurately locate individual wells. Exact locations of individual wells within each group will be determined, if necessary.

As shown on Figure 4-3, well records indicate, 22 individual wells are located within a one-mile radius of the site and 73 individual wells are situated between one and two miles of the site. Eight groups containing a total of 198 wells are located within two miles of the site: most of these wells (approximately 160) are located between one and two miles from the site. Seventeen wells, located just outside the two-mile radius, were also included in the survey. Table 4-9 lists the following information for each well identified within a two-mile radius of the site: location, installation owner, date, total depth, screen material, screened interval, static water level, and geologic material opposite the screened interval. Each well was also given a unique number, which is listed on Table 4-9 and shown with the corresponding well location on Figure 4-3.

A careful review of the water well logs has shown that only seven wells are completed in the glacial drift aquifer and that all of the remaining 303 wells are completed in the Silurian dolomite aquifer (Table 4-9). Some of the wells completed in the Silurian dolomite aquifer extend a few feet into the underlying Maquoketa shale, but none of the wells penetrate the Maquoketa shale and draw water from the underlying Cambrian-Ordovician aquifer. As discussed in Section 2.8, most wells that utilize the Silurian dolomite aquifer are completed within the upper 65 feet of the aquifer. In general, a steel casing is used to seal off the overlying glacial drift or alluvial deposits, and the rest of the borehole is left open.

Although the static water levels reported on water well records are of limited use for a detailed analysis of ground water flow, they can be used to identify regional ground water flow trends. The static water level data included on Table 4-9, support the interpretation that ground water in the Silurian dolomite aquifer flows from upland areas, where the aquifer is recharged, toward the Des Plaines River Valley and the Calumet Sag Channel Valley, where the aquifer discharges. Because ground water flows toward the southeast on the north side of the Des Plaines River Valley, all of the private wells located northwest of the Lenz Oil site are upgradient of the site, and should not be considered potential ground water receptors. Additionally, the wells located southeast of the Des Plaines River Valley are hydraulically isolated from ground water passing under the Lenz Oil site by the Des Plaines River discharge area and, therefore, should not be considered potential ground water receptors.

The area potentially impacted by ground water contamination from the Lenz Oil site is, thus, confined to the south one-half of Section 11, T37N, R11E. This area includes all of the wells between the Lenz Oil site and the Des Plaines River, and a few wells lateral to the site. The following private wells have been identified as potential candidates for sampling during Phase II of the RI, pending the results of Phase I Task 2:

- ERM Well No. 235
  Owner: Dupage County Forest Preserve, Well No. 83-2
  Location: T37N, R11E, Sec. 11, NW 1/4 of NW 1/4 of SW 1/4
  Well depth: 200 feet.

- ERM Well No. 233
  Owner: Corwin Lenz
  Location: T37N, R11E, Sec. 11, SE 1/4 of NW 1/4 of SE 1/4
  Well Depth: 125 Feet

- ERM Well No. 232
  Owner: Thomas Redichs

Location: T37N, R11E, Sec. 11, NE 1/4 of NW 1/4 of SE 1/4
Well Depth: 100 Feet

- ERM Well No. 217
  Owner: Richard Flacs
  Location: T37N, R11E, Sec. 11, SE 1/4
  375 Jeans Road
  Well Depth: 100 Feet

- ERM Well No. 234
  Owner: Nick Batistich
  Location: T37N, R11E, Sec. 11, SE 1/4 of NE 1/4 of SW 1/4
  16W 115 99th Street
  Well Depth: 165 Feet

The previous list represents all of the wells in the south half of Section 11 for which water well records exist. The IEPA previously collected ground water samples from the well owned by Corwin Lenz (ERM Well No. 233) and from several other wells in the vicinity of the site. Because water well records are not available for the other wells that IEPA sampled, pertinent information regarding the location and construction of these wells is limited or missing. Nonetheless, each of these wells is considered a potential candidate for sampling and will be investigated further. The following is a list of the private wells sampled by IEPA for which water well records no not exist:

- Well Owner: Schuster
  Location: 11 S. 305 Jackson Street

- Well Owner: Gruber
  Location: Jeans Road

- Well Owner: Williams Bait Shop
  Location: Jeans Road

- Well Owner: Kempa
  Location: 16W 414 99th Street

- Well Owner: Flacks
  Location: 97th Street

- Well Owner: Mason
  Location: Jeans Road

- Well Owner: Stein Haus
  Location: None Given

- Well Owner: Knollwood
  Location: None Given

Because municipal water service was provided to all residences in the vicinity of Lenz Oil site as part of the IEPA remedial activities conducted in 1988, it is likely that many, if not all, of the previously mentioned candidates for private well sampling are no longer in use. Thus, all of the potential candidate wells will be further investigated prior to proposing the final private well sampling locations in the Work Plan for Phase II activities.

4.7.2 Surface Water Users

As discussed in Section 2.6, runoff from the Lenz Oil site enters the drainage ditch northwest of the site and eventually infiltrates the soil or discharges to the Des Plaines River southwest of the site. ERM-North Central conducted an assessment of water usage for a two-mile stretch of the Des Plaines River, downstream of the Lenz Oil site. Inquiries were made to the Metropolitan Water Reclamation District and the Illinois State Water Survey regarding the types and locations of potential water users along the Des Plaines River, downstream of the site. Neither Agency was aware of any water users in the target area that withdrew water from the Des Plaines River, the Chicago Sanitary and Ship Canal, or the Illinois and Michigan Canal for drinking water purposes. However, several industries in the area obtained their process water from the Chicago Sanitary and Ship Canal. Prominent industrial users include the Union Oil Refinery at Romeoville and the Commonwealth Edison Power Plant, located directly across the Des Plaines River Valley from the Lenz Oil site. No other surface water users that have been identified.

4.7.3 Wetlands

Wetlands have been identified in the vicinity of the Lenz Oil site from an interpretation of aerial photographs and topographic maps of the area. Wetlands were defined as low-lying marshy areas and were not classified according to biota. As shown on Figure 2-3, several wetlands are present within a one-mile radius of the site. All of the wetlands are located within the Des Plaines River Valley, and all appear to be perched above isolated layers of impermeable soil material. Field inspections of the wetlands closest to the site revealed that they have been reduced in size by filling activity. For example, the area mapped as a wetland to the northeast of the Lenz Oil site and south of the Atchison, Topeka, and Santa Fe Railroad appears to be completely covered with fill, with the exception of a low area on the northern portion of Corwin

Lenz's property (Figure 2-1). The relatively large marshy area southeast of the site, across Jeans Road, appears to be partially occupied by an auto scrap yard (Figure 2-3). The extent to which this wetland has been altered by the activities of the scrap yard has not been established. Extensive, undisturbed wetlands exist at two locations on the strip of land between the Des Plaines River and the Chicago Sanitary and Ship Canal, one approximately 1,000 feet southeast of the site and the other approximately 5,000 feet southwest of the site (Figure 2-1). An extremely large wetland area is located along the Calumet Sag Channel, approximately two miles southeast of the site (Figure 2-1).

4.7.4 Endangered or Threatened Species

The Illinois Department of Conservation's Natural Heritage Database was accessed to determine the presence of Federal- and State-listed endangered/threatened species in the immediate vicinity of the Lenz Oil site. The database shows no record of Federal- or State-listed threatened/endangered species within a one-mile radius of the site; however, the following State-listed threatened/endangered species have been sighted within a five-mile radius of the site.

Common Name	Status
Pied-billed grebe	Endangered
Red-shouldered hawk	Endangered
Veery	Threatened
River otter	Endangered
Blazing star	Threatened
Hairy marsh yellow cress	Endangered
Awned sedge	Endangered
Crawe sedge	Threatened

In addition to the State-listed species presented above, three nature preserves and five high-quality nature areas are legally protected by the State of Illinois. These protected areas include:

Name	**Location**
Cap Sauers Holding Nature Preserve	T37N, R12E, Sec. 18
Paw Paw Nature Preserve	T37N, R12E, Sec. 5
Sagawau Canyon Nature Preserve	T37N, R11E, Sec. 13
Waterfall Glen Nature Area	T37N, R11E, Sec. 9
Cap Sauers Holding Nature Area	T37N, R12E, Sec. 12
Lemont East Geological Area	T37N, R11E, Sec. 15
Paw Paw Woods Nature Area	T37N, R12E, Sec. 5
Sagawau Canyon Nature Area	T37N, R11E, Sec. 13

This information is a summary of the existing data available to the Division of Natural Heritage.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The overall objective of the activities conducted during Phase I, Task 1 of the Lenz Oil Service, Inc. RI, and described herein, was to refine the investigative effort for Phase I, Task 2 and Phase II, Task 1. Specifically, data generated during Phase I, Task 1 were intended to fine tune the preliminary conceptual site model and assist in identifying additional sampling locations, or modifying the existing sampling plan. As a result of Phase I, Task 1 activities, the following changes were made to the preliminary conceptual site model presented in the Lenz Oil Service, Inc. Work Plan:

- The surface impoundment area was added to the list of primary contamination sources,
- Spillage and leakage were added to the list of primary release mechanisms, and
- Incinerator ash was added to the list of secondary contamination sources.

Although the preliminary conceptual site model has been revised, the scope of sampling described in the Work Plan for RI Phase I, Task 2 was designed in anticipation of these changes to the model. Specifically, the source characterization activities were designed to include sampling the incinerator ash and the soil in the area of the former surface impoundments to evaluate the nature and extent of contamination in these two secondary sources. The addition of spillage and leakage to the list of primary release mechanisms also has no affect on the proposed sampling plan. Therefore, no additional sampling locations or modifications to the existing Phase I, Task 2 activities are proposed as a result of the revised conceptual site model.

A secondary objective of the Phase I, Task 1 activities was to re-evaluate the locations and depths of proposed monitoring wells after reassessing the ground water flow direction at the site and conducting a regional fracture analysis. As discussed in Section 2.8 of this document, water level data collected by ERM-North Central in January, 1991 confirmed that shallow ground water below the Lenz Oil site flows toward the Des Plaines River. This is consistent with the ground water flow direction presented in the Work Plan, which was used as the basis for selecting the original monitoring well locations.

The results of the regional fracture analysis, as described in Sections 2.7 and 2.8 of this document, pointed out the presence of: (1) laterally extensive, solution-enlarged, horizontal joints, and (2) two orthogonal sets of vertical joints, in the Silurian dolomite aquifer below the site. According to Nicholas and Healy (1988), the primary conduits for ground water flow in the dolomite aquifer are: (1) a rubbly and highly permeable weathered zone at the top of the dolomite, and (2) the uppermost set of solution-enlarged horizontal joints in the dolomite. The shallow horizontal joints are located at elevations of 550 and 565 feet above sea level, which correspond to approximate depths of 35 and 50 feet below ground surface at the Lenz Oil site. The Work Plan requires that monitoring well borings be drilled at least 30 feet below the water table, which corresponds to an approximate total depth of 40 feet below the ground surface. Thus, the monitoring well installation program proposed in the Work Plan and Sampling and Analysis Plan is sufficient to allow placement of: (1) shallow monitoring well screens opposite the weathered zone at the top of the dolomite aquifer, and (2) deep monitoring well screens opposite of the uppermost horizontal joint set. The program is also flexible enough to permit placement of the deep well screen at a deeper more transmissive interval, if the upper joint set is shown to be a poor conduit for ground water migration. Therefore, both of the primary conduits for ground water flow in the Silurian dolomite aquifer can be monitored without changing the monitoring well installation procedure outlined in the Work Plan.

Although Nicholas and Healy (1988) identified two orthogonal sets of vertical joints in the Silurian dolomite aquifer, the location of individual vertical joints is not a predictable feature, but one that has to be confirmed by observation. Because no lineaments transecting the site were observed in the aerial photograph analysis and no outcrops are present on the site or between the site and Des Plaines River, there is presently no useful vertical joint data available to guide the placement of the monitoring well clusters. However, Nicholas and Healy (1988) suggest that ground water, and presumably contaminant, migration occurs primarily through solution-enlarged horizontal joints; therefore, the inability to place monitoring wells at vertical joint locations is probably of lesser significance to the ground water investigation. In conclusion, no changes to the monitoring well locations, depths, or installation procedures are recommended as a result of the re-evaluation of the ground water flow direction and analysis of regional bedrock fracture trends. However, revised monitoring well locations are being proposed as a result of the soil gas investigation. The soil gas investigation results and the proposed monitoring well location changes are presented in Technical Memorandum No. 2.

A third objective of the Phase I, Task 1 activities was to identify potential candidate wells for private well sampling during Phase II, Task 1 activities. As discussed in Section 4.7.1 of this document, 13 private wells have been identified as potential candidates for sampling during Phase II of the RI. Nine of the wells have been previously sampled by IEPA, but only one of the sampled wells has sufficient information regarding the location and construction of the well. Four other wells were identified through a review of water well records available from the Illinois Geological Survey and the Illinois State Water Survey. Because information regarding the location and construction of many of these candidate private wells is limited or missing, further evaluation of all the wells is necessary prior to proposing the final private well sampling locations. Furthermore, municipal water service was provided to all of the residences in the vicinity of the Lenz Oil site as part of the IEPA remedial activities conducted in 1988; therefore, it is likely that many, if not all, of the candidate wells are no longer in use. All of the candidate wells identified in Section 4.7.1 for sampling during Phase II of the RI will be carefully screened prior to proposing final private well sampling locations in the Work Plan for Phase II activities.

REFERENCES

DuPage County Circuit Court, 1988, State of Illinois vs. Lenz Oil Service, Inc., et al., Partial Consent Decree Between Plaintiffs and Certain Defendants, dated March 30, 1988.

ERM-North Central, Inc., 1990, Remedial Investigation/Feasibility Study Work Plan, Lenz Oil Service, Inc., Lemont, Illinois, Revision 3; November 12, 1990.

Foote, G.R., 1982, Fracture Analysis in Northeastern Illinois and Northern Indiana; M.S. Thesis, University of Illinois, 193 p.

Gradenour, K.E., 1990, Signed statement describing responsibilities and observations during previous Lenz Oil remedial activities.

Gibb, J.P., 1965, Report on Ground Water Conditions in Section 3, T37N, R11E, DuPage County, Illinois, Illinois State Geological Survey, 2 p.

IEPA, 1981, letter to Lenz Oil Service, Inc., written by Thomas E. Cavanagh, Jr., Manager Residual Management Section, Division of Land/Noise Pollution Control, RE: Development Permit No 1981-36-DE, dated July 5, 1981.

IEPA, 1985, Memorandum to Jim Janssen and Jim Frank, written by Steve Colantino, RE: Lenz Oil Service, Inc., dated November 18, 1985.

IEPA, 1990, Sampling Plan for the Lenz Oil Site, prepared by EBASCO Services, Inc., dated January 5, 1990.

Janssen, J., 1988, telephone conversation, IEPA project manager for Lenz Oil site remediation, conducted by David P. Edwards, ERM-North Central, Inc., RE: Lenz Oil Site Remediation.

Janssen, J., 1990, Memorandum to David Dollins, written by James Janssen, IEPA, RE: Lenz Oil Site, Liner Installation, dated July 26, 1990.

Kraatz, P., 1964, Geologic Report on the Ground-Water Conditions for a Domestistic Supply in Section 2, T37N, R11W, DuPage County, Illinois; Illinois State Geological Survey, 2 p.

Nicholas, J.R. and Healy, R.W., 1988, Tritium Migration from a Low-Level Radioactive-Waste Disposal Site near Chicago, Illinois; U.S. Geological Survey Water-Supply Paper 2333. 46 p.

Nicholas, J.R. and Shapiro, A.M., 1986, Hydraulic Characteristics of a Jointed Dolomite Beneath a Low-Level Radioactive-Waste Disposal Site; American Geophysical Union Transaction, V. 67, No. 160.

Olimpio, J.C., 1984, Low-Level Radioactive-Waste Burial at the Palos Forest Preserve, Illinois: Geology and Hydrology of the Glacial Drift, as Related to the Migration of Tritium; U.S. Gelogical Survey Water-Supply Paper 2226, 34 p.

Papadopulos, I.S., 1965, Nonsteady Flow to a Well in an Infinite Anisotropic Aquifer: International Association of Scientific Hydrology, Dubrovnik Symposium on Hydrology of Fractured Rock, Proceedings, v. 1, p 21-31.

Sherman, F.B., 1968, Geologic Report on the Ground-Water Conditions for a Municipal Supply in Section 3, T37N, R11E, DuPage County, Illinois; Illinois State Geological Survey, 2 p.

Smith, H.F., 1946, Report on Ground Water Resources in Section 5, T37N, R11E, DuPage County; Illinois State Geological Survey, 1 p.

Storm, R.R., 1946, Geological Report on the Ground Water Possibilities in Section 5, T37N, R11E, DuPage County; Illinois State Geological Survey, 1 p.

USEPA, 1984, Potential Hazardous Waste Site Preliminary Assessment for Lenz Oil Service, Inc., dated October 23, 1984.

USEPA, 1987, Hazard Ranking System Score and Documentation for Lenz Oil Service, Inc., dated October 2, 1987.

USEPA, 1989, Administrative Order by Conent, RE: Remedial Investigation and Feasibility Study, in the Matter of Lenz Oil Service, Inc., et al., November 23, 1989.

Walker, W.H., 1964, Report on Ground-Water Availability in Section 2, T37N, R11E, DuPage County, Illinois; Illinois State Geological Survey, 2 p.

Wehran Engineering, 1987, Summary Report of the Sampling Activities at the Lenz Oil Service Site, prepared for IEPA, dated March 5, 1987.

Willman, H.B., 1971, Summary of the Geology of the Chicago Area, Illinois State Geological Survey Circular 460, 77 p.

Willman, H.B.; Atherton, E.; Buschbach, T.C.; Collinson, C.; Frye, J.C.; Hopkins, N.E.; Lineback, J.A.; and Simon, J.A.; 1975, Handbook of Illinois Stratigraphy, Illinois State Geological Survey Bulletin 95, 261 p.

Willman, H.B. and Lineback, J.A., 1970, "Surficial Geology Map of the Chicago Region," in Summary of the Geology of the Chicago Area, Illinois State Geological Survey Circular 460, 77 p.

Zeizel, A.T.; Walton, W.C.; Sasman, R.T.; and Prickett, T.A.; 1962, Ground Water Resources of DuPage County, Illinois; Illinois State Water Survey and Illinois State Geological Survey Cooperative Ground Water Report 2.

TABLE 2-1
VERTICAL JOINT ORIENTATION MEASUREMENTS

Lenz Oil Service, Inc. Site
Lemont, Illinois

Joint Azimuth	All Outcrops	Outcrops #1-#5[1]	Outcrops #6 and #7[2]
0-5°	1	1	
5-10°	1	1	
10°-15°	3	2	1
15-20°	3	1	2
20-25°	5	3	2
25-30°	2	2	
30-35°	3	2	1
35-40°	4	3	1
40-45°	11	6	5
45-50°	24	15	9
50-55°	20	15	5
55-60°	19	16	3
60-65°	6	5	1
65-70°	1	1	
70-75°	1		1
75-80°			
80-85°	1	1	
85-90°			
90-95°	2	2	
95-100°	1	1	

TABLE 2-1
VERTICAL JOINT ORIENTATION MEASUREMENTS

Lenz Oil Service, Inc. Site
Lemont, Illinois

Joint Azimuth	All Outcrops	Outcrops #1-#5[1]	Outcrops #6 and #7[2]
100-105°	2	2	
105-110°	5	4	1
110-115°	5	4	1
115-120°	19	14	5
120-125°	23	15	8
125-130°	17	8	9
130-135°	29	12	17
135-140°	29	11	18
140-145°	24	12	12
145-150°	7	3	4
150-155°	5	3	2
155-160°	1	1	
160-165°	1		1
165-170°			
170-175°	1		1
175-180°	2	1	1
Total	278	167	111

Notes:

[1] Outcrops #1 through #5 are located near the Calumet Sag Channel and may have been disturbed by construction activities.

[2] Outcrops #6 and #7 are located away from the Calumet Sag Channel and are probably undisturbed.

TABLE 2-2
WATER LEVEL MEASUREMENTS

Lenz Oil Service, Inc. Site
Lemont, Illinois

Well No.	T.O.C.	B.H.	W.L. 3/20/91	W.L. 2/26/91	W.L. 1/29/91	W.L. 1/6/88	W.L. 3/2/88	W.L. 6/4/86	W.L. 5/28/86
G101M	612.05	588.42	16.51(595.54)	16.30(595.75)	17.47(594.58)	17.88(594.17)	17.64(594.41)	18.90(593.15)	18.32(593.73)
G101L	611.25	570.25	15.41(595.84)	17.10(594.15)	17.67(593.31)	17.12(594.13)	16.89(594.36)	17.90(593.35)	17.64(593.61)
G101D	610.98	576.63	15.41(595.57)	16.34(594.64)	16.72(594.53)	16.98(594.00)	16.81(594.17)	--- (---)	17.52(593.46)
G102L	601.63	584.93	8.02(593.61)	9.65(591.98)	10.24(591.39)	9.54(592.09)	9.64(591.99)	11.10(590.53)	10.18(591.45)
G102D	602.41	580.89	8.98(593.43)	10.60(591.81)	11.18(591.23)	10.50(591.91)	10.60(591.81)	11.90(590.51)	--- (---)
G104L	602.60	±592.1	3.22(599.38)	4.73(597.87)	Frozen(---)	6.09(596.51)	5.72(596.88)	7.30(595.30)	6.07(596.53)
G104D	602.38	586.98	7.03(595.35)	8.04(594.34)	8.40(593.98)	8.53(593.85)	8.48(593.90)	7.50(594.88)	9.14(593.24)
G105S	Damaged	---	Abandoned	Damaged	Damaged(---)	9.59(---)	Damaged(---)	Not Installed	Not Installed
G105D	602.56(?)	±568.7	Abandoned	6.94(595.62)	Damaged(---)	5.45(597.11)	8.27(594.29)	Not Installed	Not Installed
G106S	603.08	±588.58	6.87(596.21)	9.54(593.54)	11.66(591.42)	11.92(591.16)	Dry?(-588)	Not Installed	Not Installed

Notes: T.O.C. = Top of Casing Elevation.
B.H. = Bottom of Hole Elevation.
W.L. = Water Level Depth/Elevation.
--- = No Data Collected.

TABLE 3-1

LENZ OIL SERVICE, INC.
1980-1981 WASTE STREAM

Waste Types Accepted	**Approximate Volumes Handled**
Waste Oils	6,000 - 10,500 gallons/day
-Motor oil -Hydraulic oil -Cutting oil -Lubricating oils -Transformer oil	
Spent Solvents	5,000 gallons/month
-Chlorinated solvents -Oxygenated solvents -Methyl ethyl ketone -Toluol -Ethanol -Hexane -Heptane -Acetate -Alcohol -Zylol -Other nonchlorinated solvents	
Pigments	
Inks	

Source: Letters from Charles Russell to IEPA, dated 12-10-80 and 3-31-81.

TABLE 3-2

LENZ OIL SERVICE, INC.
NON-WASTE MATERIALS STORED ON SITE

Material	Approximate Volume
Asphalt	1,000 gallons
Diesel	----
Gasoline	----

Source: Letter from Charles Russell to IEPA, dated 12-10-80.

TABLE 3-3

LENZ OIL SERVICE, INC.
1984 WASTE STREAM

Waste Types Accepted	Approximate Voumes Handled
Hazardous waste	33,820 gallons/year
Nonhazardous waste	582,444 gallons/year
Petroleum hydrocarbons	
Aliphatic hydrocarbons	
Aromatic hydrocarbons	
Chlorinated hydrocarbons	
Methylene chloride	
Trichloroethylene	
Alcohol	
Naptha	
Acetone	
1,1,1-Trichloroethylene	
Toluene	
Xylene	
Kerosene	
Aliphatic Napthas	
Aromatic Napthas	
Methyl ethyl ketone	
Ethyl acetate	
Butanol	

Source: IEPA report dated 1-17-85.

TABLE 3-4

LENZ OIL SERVICE, INC.
TOTAL REPORTED WASTE STREAM THROUGH 5/24/86

Waste Types Accepted	Approximate Volumes Handled (Gallons/Year)
Waste solvents and ink	137,470
Waste solvents, inks and oils	13,320
Waste solvents	50,015
Waste automobile oil	2,752,792
Waste oil & water	68,514
Other waste oils	26,536
Soil contaminated with #5 fuel oil	2,020
Total	3,098,371

Source: IEPA report, dated 5-24-86.

TABLE 3-5
LENZ OIL SITE

AERIAL PHOTOGRAPH INFORMATION

Figure	Date	Approximate Photograph Scale	Film Type	Photo Source
3-4	October 7, 1954	1" = 333'	B & W[1]	ASCS[2]
3-5	September 6, 1961	1" = 333'	B & W	ASCS
3-6	September 30, 1967	1" = 333'	B & W	ASCS
3-7	May 14, 1971	1" = 333'	B & W	ASCS
3-8	October 10, 1974	1" = 333'	B & W	ASCS
3-9	November 7, 1981	1" = 750'	B & W	ASCS
3-10	April 12, 1988	1" = 333'	B & W	ASCS

[1] B & W : Black and White.

[2] ASCS : U.S. Department of Agriculture, Agriculture Stabilization and Conservation Service, Salt Lake City, Utah.

TABLE 4-1

REPORTED CONTAMINANTS IN LENZ OIL DRUMS, TANKS, AND TANK TRUCKS

Contaminant	Range of Concentrations Detected			
Antimony	<0.5	-	26.2	mg/kg
Aroclor 1016	<5.0	-	25.0	mg/kg
Aroclor 1242	<5.0	-	85.0	mg/kg
Aroclor 1248	<5.0	-	62.0	mg/kg
Aroclor 1260	<5.0	-	26.0	mg/kg
Arsenic	0.35	-	33.94	mg/kg
Barium	<200	-	1020.0	mg/kg
Beryllium	<2.0	-	2.5	mg/kg
Cadmium	<20	-	30.0	mg/kg
Chromium	<20	-	1235.0	mg/kg
Copper	<10	-	345.0	mg/kg
Cyanide, Reactive	<5	-	349.0	mg/kg
Cyanide, Total	<5	-	165.0	mg/kg
Lead	<4.6	-	2030.0	mg/kg
Mercury	<1.0	-	4.06	mg/kg
Nickel	<1.9	-	350.0	mg/kg
PCBs, Total	<5	-	85.0	mg/g
Selenium	<0.6	-	0.14	ug/l
Zinc	<20.0	-	6310.0	mg/kg
Naphthalene	N/A	-	9100.0	ug/g
Methyl Naphthalene	N/A	-	4700.0	ug/g
Dimethyl Naphthalene	N/A	-	3000.0	ug/g
Trimethyl Naphthalene	N/A	-	1920.0	ug/g
Anthracene	N/A	-	510.0	ug/g
1,1-dichloroethane	N/A	-	93.0	ug/g
1,1,1-Trichloroethane	N/A	-	11,000.0	ug/g
Trichloroethylene	N/A	-	5,100.0	ug/g
Benzene	N/A	-	16,000.0	ug/g
Tetrachloroethylene	N/A	-	7,900.0	ug/g
Toluene	N/A	-	45,000.0	ug/g
Ethyl Benzene	N/A	-	33,000.0	ug/g
Xylene	N/A	-	77,100.0	ug/g
Phenol	N/A	-	54,000.0	ug/l
2,4-dimethylphenol	N/A	-	4,800.0	ug/l

NOTE: N/A - Not Available

TABLE 4-2

REPORTED CONTAMINANTS IN SURFACE IMPOUNDMENTS
(ALL RESULTS IN mg/Kg)

Parameter	Flow from Surface Impoundment	Surface Impoundment
Organics and PCBs		
Phenol Ethanone	51	23
Aliphatic Acids	92	< 0.5
Aliphatic Acid Esters	55	< 0.5
Cyclohexanone	57	< 0.5
Other Organic Compounds	400	150
Phenol	27	54
2,4-Dimethylphenol	< 0.5	4.8
Methyl Phenol	Trace	7.9
Phenoxy Ethanol	150	93
Methyl Benzene Methanol	600	340
Benzene Ethanol	130	69
Methyl Benzene Ethanol	230	120
Butoxy Ethanol	130	57
Butoxy Ethoxy Ethanol	190	38
Ethoxy Butoxy Ethoxy Ethanol	79	63
Other Aliphatic Alcohols	220	640
PCBs	< 0.05	0.0003
Metals		
Chromium	0.06	ND
Copper	ND	0.05
Iron	8.4	5.3
Lead	ND	0.28
Manganese	5.44	ND
Mercury	0.00406	0.00218
Zinc	ND	2.8

Note: ND = Not Detected

TABLE 4-3
REPORTED CONTAMINANTS IN ON SITE SOILS
(Page 1 of 3)

Parameter	**Concentration Range**
Metals	**(mg/kg)**
Aluminum	NA - 37960
Antimony	<0.006
Arsenic	<2.09 - 14.3
Barium	<200 - 3250
Beryllium	<0.091 - 2.64
Cadmium	<0.054 - 8.57
Chromium	<0.008 - 43.6
Cobalt	<10 - 11.3
Copper	<5 - 62.1
Iron	N/A - 33800
Lead	N/A - 1250
Maganese	N/A - 835
Mercury	<0.01 - 0.14
Nickel	<0.36 - 35.8
Selenium	<0.25 - 0.66
Silver	<0.18 - 7.97
Thallium	<0.17 - 3.9
Varadium	<10 - 81.2
Zinc	N/A - 440
Volatile Organics	**(ug/kg)**
1,1-Dichloroethane	<5 - 68000
Trans - 1,2Dichlroethene	<5 - 80000
2-Butanone	<10 - 2800
1,1,1-Trichloroethane	<5 - 85000

TABLE 4-3
REPORTED CONTAMINANTS IN ON SITE SOILS
(Page 2 of 3)

Trichloroethene	<5 - 140000
Benzene	<5 - 8500
4-Methyl-2-pentanone	<10 - 15000
Tetrachloroethene	<5 - 32000
Toluene	<5 - 890000
Ethylbenzene	<5 - 26000
Total Xylenes	<5 - 2000000
Semi-Volatile Organics	**(ug/kg)**
1,2-Dichlorobenzene	<330 - 34000
4-Methylphenol	<330 - 11000
Isophorone	<330 - 9200
2,4-Dimethylphenol	<330 - 5000
Naphthalene	<330 - 30000
2-Methylnaphthalene	<330 - 65000
Acenaphthlene	<330 - 2400
Phenol	<330 - 10000
Dibenzofuran	<330 - 1700
Fluorene	<330 - 3500
Phenanthrene	<330 - 12000
Anthracene	<330 - 2100
Di-n-butylphthalate	<330 - 3500
Fluoranthene	<330 - 7500
Pyrene	<330 - 5500
Butylbenzylphthalate	<330 - 2400
Benzo(a)anthracene	<330 - 3300
Chrysene	<330 - 3400
bis(2-Ethylhexyl)phthalate	<330 - 27000

TABLE 4-3
REPORTED CONTAMINANTS IN ON SITE SOILS
(Page 3 of 3)

Benzo(b)fluoranthene	<330 - 2500
Benzo(a)pyrene	<330 - 2300
Indeno(1,2,3-cd)pyrene	<330 - 1300
Benzo(g,h,i)perylene	<330 - 1800

TABLE 4-4

REPORTED CONTAMINANTS IN INCINERATOR ASH

Analyte	Concentration Range (ug/lg)
Isophorone	<115 - 1800
Naphthalene	< 115
2-Methylnaphthalene	<1,000
Phenanthrene	<1,000
Pyrene	< 115
bis (2-ethylhexyl) phethalate	<1,000
Fluoranthene	< 115

Note: No volatile organic analysis available.

TABLE 4-5

REPORTED CONTAMINATION IN TENT SAMPLES

Parameter	Detection Limits (ug/kg)	Max. Detected Concentration (ug/kg)
Isophorone	20000	12000J
Naphthalene	20000	35000
2-Methylnaphthalene	20000	36000
Acenaphthlene	20000	4400J
Dibenzofuran	20000	4200J
Fluorene	20000	5600J
Phenanthrene	20000	17000J
Anthralene	20000	3100J
Di-n-butylphthalane	20000	1800J
Fluoranthene	20000	7900J
Pyrene	20000	9200J
Butylbenzlphthalate	5000	490J
Benzo(a)anthracene	20000	3400J
Chrysesne	20000	3400J
bis(2-Ethylhexyl)phthalate	20000	17000JB

Notes:

(1) J - Indicates that the compound was analyzed for and detected at concentrations below the detection limit. The reported value is estimated.

B - The analyte was also found in the blank.

TABLE 4-6

PRIVATE WELL SAMPLING PARAMETERS

RESIDENCE	ADDRESS	METALS	NITRATES	VOLATILES	SEMI-VOLATILES	PCBs/PEST.	CYANIDE
Schuster	11 S. 305 Jackson Street	X	X	X	X	X	X
Gruber	Jeans Road	X	X	X	X	X	X
Williams	Jeans Road	X	X	X	X	X	X
Kempa	16 W 415 99th Street			X	X	X	
Flaks	97th Street			X	X	X	
Lenz	Route 2, Box 208	X	X	X	X	X	X
Mason	Jeans Road	X	X				
Stein Haus	Not Recorded	X					
Knowlwood	Not Recorded	X					

TABLE 4-7

REPORTED CONTAMINANTS IN PRIVATE WELLS
(ALL RESULTS IN mg/l)

	RESIDENCE/SAMPLING DATE						
	WILLIAMS (11/6/86)	BOWLES (11/6/86)	GRUBER (11/6/86)	MASON (11/6/86)	WILLIAMS (3/5/85)	WILLIAMS (6/3/87)	WILLIAMS (7/29/86)
Metals							
Barium	0.080	<0.050	<0.050	<0.050	<0.1	0.063	N/A
Chromium	0.015	<0.010	0.013	<0.010	N/A	N/A	N/A
Copper	0.173	2.99	0.052	0.021	N/A	N/A	N/A
Iron	2.03	0.257	0.563	2.13	1.80	1.55	N/A
Lead	0.008	0.021	0.008	0.005	<0.05	1.55	N/A
Manganese	0.048	0.022	0.038	0.072	<0.04	0.007	N/A
Silver	0.070	0.188	0.040	0.011	<0.010	0.016	N/A
Vanadium	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	N/A
Zinc	0.110	0.585	0.239	0.053	<0.010	0.056	N/A
Volatile Organics							
Acetone	<0.005	<0.005	0.012	<0.005	0.710	<0.005	<0.005
Cloroethane	<0.005	<0.005	<0.005	<0.005	Trace	0.011	0.010
Benzene	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005
Ethylbenzene	<0.005	<0.005	<0.005	<0.005	Trace	<0.005	<0.005
Xylene	<0.005	<0.005	<0.005	<0.005	Trace	<0.005	<0.005

Note: N/A = Not Applicable

TABLE 4-8

REPORTED CONTAMINANTS IN LENZ OIL GROUND WATER

Contaminant	Range of Concentrations Detected
Chloroethane	<10 - 112.0 ug/l
C-1,2dichloroethene	<5 - 460.0 ug/l
1,2-dichloroethane	<5 - 215.0 ug/l
1,1,1-trichloroethane	<5 - 252.0 ug/l
Benzene	<5 - 110.0 ug/l
Vinyl Chloride	<10 - 22.0 ug/l
Tetrachloroethene	<5 - 7.4 ug/l
1,1-dichloroethane	<5 - 200.0 ug/l
Toluene	<5 - 1,000.0 ug/l
2-butanone(methyl ethyl ketone)	<10 -13,700.0 ug/l
Ethylbenzene	<5 - 43.0 ug/l
Xylene, Total	<5 - 180.0 ug/l
PCBs, Total	N/A 200.0 ug/l
Naphthalene	<10 - 13.0 ug/l
Methyl Naphthalene	<10 - 47.0 ug/l
Dimethyl Naphthalene	N/A 100.0 ug/l
Trimethyl Naphthalene	N/A 80.0 ug/l
Anthracene	<10 - 45.0 ug/l
1,2-dichloroethylene	<5 - 61.0 ug/l
Isophorone	<10 - 32.0 ug/l
Phenol	<10 - Trace ug/l

NOTE: N/A - Not Applicable

TABLE 4-9
LENZ OIL SITE
PRIVATE WELL DATA

ERM NO.	COUNTY NO.	TOWN-SHIP	RANGE	SEC(1/4)	LOCATION	OWNER	DATE COMPLETED	TOTAL DEPTH	SCREEN MATL.	SCREENED INTERVAL	STATIC WATER	GEOLOGIC MATERIAL
1		38N	11E	36 (SE)	15 W 218 87TH ST.(SE,SW,SE)	BURR OAK DEVLP.	6/13/89	220	OPEN	106-220	99	ROCK
2	26532	38N	11E	36 (SE)	5025 S. SEELEY (SW,SE,SE)	ROBERT NERI	4/24/81	180	OPEN	90-180	100	LIMESTONE
3	2910	38N	11E	36 (SW)	JAROS RESUB LOT #4	RELIABLE CONST.	7/27/72	170	OPEN	146-170	100	ROCK
4	1723	38N	11E	35 (SE)	DOWNER'S GROVE TWP. (SE,SE,SE)	TORRICK	1941	160	OPEN?	114-160		ROCK
5	23670	38N	11E	35 (SE)	9 S 666 MEADOWBROOK DR.	RELIABLE CONST.	3/20/74	170	OPEN	148-170	48	LIMESTONE
6	27892	38N	11E	35 (SE)	8421 MEADOWBROOK DR.	RICHARD PATTON	8/3/87	240	OPEN	154-240	140	LIMESTONE
7	28261	38N	11E	35 (SE)	10 S 131 LEONARD (SE,SE,SE)	HAMLET STEPHENS	8/20/88	190	OPEN	125-190	50	LIMESTONE
8		38N	11E	35 (SW)	8425 MEADOWBROOK (LOT #10)	GENE VINEYARD	8/10/76	150	OPEN		119	LIMESTONE
9	960	38N	11E	35 (SW)	TLE #66 (S/2,SW,SW)	JOHN HUINER	1/29/68	180	OPEN?	138-180	75	LIMESTONE
10	1717	38N	11E	35 (SW)	TRI-STATE VILLAGE (E/2,SW)	CASINO BELLOTA	1948	25	CEMENT	10-25		SAND/CLAY
11	1719	38N	11E	35 (SW)	(TSV) 279 ROSE ST.(E/2,SW)	STANLEY FRYZA	1948	36	CEMENT	10-36		SAND
12	1720	38N	11E	35 (SW)	(TSV) 407 JANET AVE.(E/2,SW)	LESTER LARSON	1948	26	CEMENT	10-26		SAND/CLAY
13	1721	38N	11E	35 (SW)	(TSV) JANET AVE.(E/2,SW)	FRANK POLKA	1948	32	CEMENT	10-32		SAND
14	1798	38N	11E	35 (SW)	(TSV) LOT #8 (SE,SW)	TSV DEVELOPMENT	1941	206	OPEN?	136-206		LIMESTONE
15	2910	38N	11E	35 (SW)	JAROS RE-SUB.	RELIABLE CONST.	3/7/72	170	OPEN	146-170	100	ROCK
16	24482	38N	11E	35 (SW)	TLE LOT #70 (SW,SW)	THOMAS JANSKY	11/25/75	220	OPEN	120-220	120	LIMESTONE
17	24589	38N	11E	35 (SW)	(TSV) LOT #1 (E/2,SW)	JOSEPH GAREST,JR.	6/22/76	165	OPEN	112-165	85	LIMESTONE
18	24812	38N	11E	35 (SW)	TIMBERLAKE ESTATES LOT #62	PARRISH CONST.	9/15/76	160	OPEN	125-160	28	LIMESTONE
19	25811	38N	11E	35 (SW)	9 S 750 WILLIAM DR.(SE,SW,SW)	HENRY PAETSCH	9/23/76	235	OPEN?	180-235	85	LIMESTONE
20	26526	38N	11E	35 (SW)	8627 MEADOWBROOK (SW,NW,SE)	CLIFF WARTHEN	8/2/80	205	OPEN	141-205	129	LIMESTONE
21	26527	38N	11E	35 (SW)	9 S 274 BROOKBANK (SW,SW,SW)	CHARLES ZAK	6/24/82	220	OPEN	122-220	79	LIMESTONE
22	27078	38N	11E	35 (SW)	17 W 155 W.87TH (TLE #81)	GEORGE SKUNDRNA	6/24/85	200	OPEN	150-200	99	LIMESTONE
23	28299	38N	11E	35 (SW)	207 BONNIE BRAE (SW,SE,SW)	CHRIS SALAMOUSKI	10/4/88	185	OPEN	108-185	89	LIMESTONE
24	3105	38N	11E	34 (E/2)	TLE LOT #81 (E/2,E/2)	JAS RAY	2/13/73	180	OPEN	108-180	100	ROCK
25	3366	38N	11E	34 (E/2)	(TLE #8) 7946 TENNESSEE(E/2,E/2)	FRANK ZELIP	9/15/73	180	OPEN	106-180	100	LIMESTONE
26	24358	38N	11E	34 (E/2)	8220 CLARENDON HILLS RD.	RICHARD CECHOWSKI	10/15/75	190	OPEN	130-190	80	LIMESTONE
27		38N	11E	34 (SE)	NW 16 FRONTAGE RD.(SE,SE,SE)	ART SALLNER?	10/9/74	165	OPEN	94-165	74	LIMESTONE
28		38N	11E	34 (SE)	TIMBER LAKE ESTS. LOT #47	PARRISH CONST.	2/15/72	140	OPEN	120-140	58	ROCK
29		38N	11E	34 (SE)	350 MEADOW CT. (TLE #67)	MIKE YAO	9/9/75	160	OPEN	115-160	83	LIMESTONE
30	84	38N	11E	34 (SE)	DU PAGE CO. (SW,SW,SE)	A.F. BUILDERS	1957	170	OPEN	112-170	58	LIMESTONE
31	85	38N	11E	34 (SE)	DU PAGE CO.(SE,SE)	A.F. BUILDERS	1955	185	OPEN	145-185	75	LIMESTONE
32	2280	38N	11E	34 (SE)	9 S 580 CLARENDON HILLS(NE,SE,SE)	KETTELL CONST.	10/20/71	127	STL CAS?	100-127	89	GRAVEL
33	24254	38N	11E	34 (SE)	(TLE) 9 S 709 LORRAINE (SE,SE)	ROBERT ZINTAK	10/7/75	180	OPEN	138-180	108	LIMESTONE
34	24809	38N	11E	34 (SE)	(TLE)9 S 642 LORRAINE(S/2,SE,SE)	ACCURATE DESIGN	9/13/76	200	OPEN	148-200	80	LIMESTONE
35	26518	38N	11E	34 (SE)	(TLE LOT #47) 8015 ALABAMA	ALBERT SUCHA	10/19/79	195	OPEN	123-195	100	LIMESTONE

TABLE 4-9
LENZ OIL SITE
PRIVATE WELL DATA

ERM NO.	COUNTY NO.	TOWN-SHIP	RANGE	SEC(1/4)	LOCATION	OWNER	DATE COMPLETED	TOTAL DEPTH	SCREEN MATL.	SCREENED INTERVAL	STATIC WATER	GEOLOGIC MATERIAL
36	26519	38N	11E	34 (SE)	(TLE) 8035 TENNESSEE (NW,NE,SE)	ROBERT SVATEK	10/9/80	185	OPEN	116-185	84	LIMESTONE
37	26525	38N	11E	34 (SE)	8425 MEADOWBROOK DR.	GENE VINEYARD	4/1/76	220?	OPEN	150-220?	119	LIMESTONE
38		38N	11E	34 (SW)	1033 FRONTAGE RD. (SW,SE,SW)	CHESTER GASAWAY	2/24/84	200	OPEN	97-200	79	LIMESTONE
39	905	37N	12E	6 (NW)	87TH & COUNTY LINE RD.(NW,NE,NW)	CATALINA CONST.	3/2/68	160	OPEN	84-160	36	LIMESTONE
40	25841	37N	12E	6 (NW)	8901 COUNTY LINE RD.(SW,NW,NW)	WILLIAM JOHNSTON	11/23/77	160	OPEN	103-160	98	LIMESTONE
41	29367	37N	12E	6 (NW)	NE 1/4 OF SW 1/4 OF NW 1/4	GEORGE MATOCHA	8/19/79	140	OPEN	90-140	58	LIMESTONE
42	29368	37N	12E	7 (NW)	133 E. OGDEN AVE.? (NW,NW)	ROWELL CHEMICAL	10/13/83	100	OPEN	40-100	8?	LIMESTONE
43	25394	37N	12E	7 (SW)	FOREST PRESERVE (NW,NW,SW)	ARGONNE LAB	9/23/76	173	OPEN	128-173	140	LIMESTONE
44	25395	37N	12E	7 (SW)	FOREST PRESERVE (NW,NW,SW)	ARGONNE LAB	9/28/76	280	OPEN	116-280	99	LS/SHALE
45	25396	37N	12E	7 (SW)	FOREST PRESERVE (NW,NW,SW)	ARGONNE LAB	9/20/76	201	OPEN	160-201	98	LIMESTONE
46	2144	37N	12E	18 (NW)	U. OF C. EXP. STA. (NW,NW,NW)	IL WATER SURVEY	1/44	308	OPEN	171-308	153	LIMESTONE
47	25397	37N	12E	18 (NW)	FOREST PRESERVE (NW,NW,NW)	ARGONNE LAB	9/17/76	215	OPEN	175-215	160	LIMESTONE
48		37N	11E	1 (NE)	11519 ROSEMERE (NE,NE,NE)	EDWARD OTTO	11/28/69	180	OPEN	100-180	115	LIMESTONE
49		37N	11E	1 (NE)	87TH ST. S. OF HINSDALE (SW,NE)	ED MALICK		150	OPEN	56-150		ROCK
50		37N	11E	1 (NE)	15 W 051 87TH (NE,NW,NE)	CARL LAUDONDO	11/18/83	185	OPEN	77-185	59	LIMESTONE
51		37N	11E	1 (NE)	15 W 620 89TH (SW,NW,NE)	VAL ADAMKUS	10/2/79	220?	OPEN	133-220?	136	LIMESTONE
52	1111	37N	11E	1 (NE)	CVE (NE,SE,NE)	TERRY HECTOR	1/30/68	71	OPEN	44-71	18	LIMESTONE
53	1118	37N	11E	1 (NE)	CVE #33 (E/2,NE)	TERRY HECTOR	5/68	80	OPEN	52-80	31	SHALE?
54	1119	37N	11E	1 (NE)	CVE #20 (E/2,NE)	TERRY HECTOR	5/68	80	OPEN	52-80	21	SHALE?
55	1120	37N	11E	1 (NE)	CVE #1 (E/2,NE)	TERRY HECTOR	5/68	75	OPEN	48-75	24	SHALE?
56	1121	37N	11E	1 (NE)	CVE #44 (E/2,NE)	TERRY HECTOR	5/68	79	OPEN	42-79	27	SHALE?
57	1122	37N	11E	1 (NE)	CVE #38 (E/2,NE)	TERRY HECTOR	5/68	75	OPEN	46-75	26	SHALE?
58	1123	37N	11E	1 (NE)	CVE #18 (E/2,NE)	TERRY HECTOR	6/68	80	OPEN	46-80	28	LIMESTONE
59	1564	37N	11E	1 (NE)	SE 1/4 OF SW 1/4 OF NE 1/4	KOTELLA		120	OPEN?	75-120?		ROCK
60	3430	37N	11E	1 (NE)	NE 1/4 OF SE 1/4 OF NE 1/4	DIORIO BLDRS.	10/18/73	213	OPEN	80-213	59	ROCK
61	23693	37N	11E	1 (NE)	11 S 420 DREW (NW,NE,NE)	RICHARD SOMOLIK	1/7/74	113	OPEN	74-113	19	LIMESTONE
62	23863	37N	11E	1 (NE)	15 W 101 87TH ST.(NE,NE,NE)	RONALD CHOCHOLA	9/23/74	200	OPEN	70-200	60	LIMESTONE
63	23908	37N	11E	1 (NE)	15 W 101 87TH ST.(NE,NE,NE)	RONALD CHOCHOLA	12/4/74	160	OPEN	68-160	60	LIMESTONE
64	24228	37N	11E	1 (NE)	8750 S. COUNTY LINE(SW,NW,NE)	JOHN PARTEPELO	7/22/75	200	OPEN	60-200	38	ROCK
65	25015	37N	11E	1 (NE)	NW 1/4 OF SE 1/4 OF NE 1/4	PAT ALDERTINI	12/2/76	205	OPEN	136-205	138	LIMESTONE
66	25220	37N	11E	1 (NE)	15 W 101 87TH ST.(NE,NE,NE)	RONALD CHOCHOLA	11/2/78	180	OPEN	60-180	98	LIMESTONE
67	28428	37N	11E	1 (NE)	15 W 305 91ST ST. (S/2,NE)	CAM KRAUSE	7/20/84	200	OPEN	97-200	70	LIMESTONE
68		37N	11E	1 (NW)	8900 S. MADISON (NW,SW,NW)	EDWARD PRINER	1/4/82	200	OPEN	126-200	60	ROCK
69		37N	11E	1 (NW)	15 W 620 89TH ST (PAYNE'S #1)	RICHARD REDIEHS	9/10/79	220	OPEN	125-220	130	LIMESTONE

TABLE 4-9
LENZ OIL SITE
PRIVATE WELL DATA

ERM NO.	COUNTY NO.	TOWN-SHIP	RANGE	SEC(1/4)	LOCATION	OWNER	DATE COMPLETED	TOTAL DEPTH	SCREEN MATL.	SCREENED INTERVAL	STATIC WATER	GEOLOGIC MATERIAL
70	2129	37N	11E	1 (NW)	SPACE VALLEY SUBD. LOT #19	CHATEAU HOMES	6/28/71	130	OPEN	100-130	70	ROCK
71	3128	37N	11E	1 (NW)	10 S 245 MADISON ST.(NW,SW,NW)	G. RODRIGUEZ	3/3/73	180	OPEN	120-180	130	LIMESTONE
72	3480	37N	11E	1 (NW)	OAKDALE LOT #19 (SW,NW)	JACK WHEELER	11/5/73	200	OPEN	130-200	112	ROCK
73	25221	37N	11E	1 (NW)	(OD #37)10 S 230 GRANT(NE,SW,NW)	GARY HERMES	8/24/78	188	OPEN	120-188	120	LIMESTONE
74	25222	37N	11E	1 (NW)	ERICKSON MANOR SUBD. LOT #1	PONSTERN BLDRS.	10/31/78	190	OPEN	110-190	38	LIMESTONE
75	27169	37N	11E	1 (NW)	15 W 720 89TH ST. (SW,NW,NW)	WILLIAM NORRIS	11/5/85	250	OPEN	126-250	125	LIMESTONE
76		37N	11E	1 (SE)	87TH ST. S. OF HINSDALE (NW,SE)	WILLIAM WASHER		120	OPEN	94-120		ROCK
77		37N	11E	1 (SE)	87TH ST. S. OF HINSDALE (SW,SE)	CRADEVILL		54	OPEN	40-54		ROCK
78	1565	37N	11E	1 (SE)	W/2 OF NE 1/4 OF SE 1/4	JOHN RACEK	5/37	160	OPEN?	60-160	60	SIL DOL
79		37N	11E	1 (SW)	1818 S. CLARENCE (OAK RIDGE #3)	TONY SARACCO	8/26/82	200	OPEN	124-200	69	ROCK
80	1032	37N	11E	1 (SW)	10 S 441 MADISON ST.(NW,NW,SW)	KETTEL CONST.	5/14/68	140	OPEN	105-140	94	LIMESTONE
81	1061	37N	11E	1 (SW)	10 S 445 GLENN (SV LOT #3)	SEFARA BLDRS.	11/15/68	160	OPEN	85-160	50	LIMESTONE
82	1185	37N	11E	1 (SW)	SPACE VALLEY LOT #1	SEFARA BLDRS.	5/10/69	160	OPEN	100-160	90	LIMESTONE
83	1241	37N	11E	1 (SW)	SPACE VALLEY LOT #4	SEFARA BLDRS.	10/15/69	160	OPEN	100-160	80	LIMESTONE
84	2033	37N	11E	1 (SW)	10 S 580 GLENN DR.(SW,NW,SW)	SEFARA BLDRS.	5/24/71	180	OPEN	85-180	65	ROCK
85	2120	37N	11E	1 (SW)	91ST & MADISON (NW,NW,SW)	THOMAS BEURSKEN	7/3/71	170	OPEN	110-170	59	ROCK
86	2130	37N	11E	1 (SW)	SPACE VALLEY #6 (NW,SW,SW)	SEFARA BLDRS.	7/27/71	265	OPEN	133-265	138	ROCK
87	2309	37N	11E	1 (SW)	(AD#40)11 S 344 MADISON(W/2,SW)	ROBERT NEWMAN	11/23/71	130	OPEN	45-130	10	LIMESTONE
88	2430	37N	11E	1 (SW)	10 S 607 GLENN DR. (NW,SW,SW)	KETTEL CONST.	3/22/72	165	OPEN	120-165	104	LIMESTONE
89	2472	37N	11E	1 (SW)	SW 1/4 OF SW 1/4 OF SW 1/4	RELIABLE CONST.	4/28/72	120	OPEN	105-120	78	ROCK
90	3129	37N	11E	1 (SW)	(SV #5)10 S 675 GLENN(NW,SW,SW)	SWANSON	3/3/73	190	OPEN	118-190	130	LIMESTONE
91	3228	37N	11E	1 (SW)	SPACE VALLEY SUBD. LOT #31	CASTLE BLDRS.	7/2/73	160	OPEN	100-160	50	ROCK
92	3229	37N	11E	1 (SW)	10 S 581 MADISON ST.(SV #35)	LEROY SKRIDEN	5/25/73	180	OPEN	116-180	110	LIMESTONE
93	3431	37N	11E	1 (SW)	NORTH 100', LOT #61	RELIABLE CONST.	7/22/73	135	OPEN	120-135	53	LIMESTONE
94	3479	37N	11E	1 (SW)	SPACE VALLEY LOT #20	PAUL SMITH	11/6/73	160	OPEN	102-160	115	LIMESTONE
95	24318	37N	11E	1 (SW)	15 W 531 89TH (SW,SE,SW)	STEVENS BLDRS.	10/16/75	190	OPEN	125-190	80	LIMESTONE
96	24579	37N	11E	1 (SW)	SPACE VALLEY SUBD. LOT #32	ALEX McCRACKEN	5/17/76	180	STL CAS?	0-180	58	LIMESTONE
97	24747	37N	11E	1 (SW)	SE 1/4 OF NE 1/4 OF SW 1/4	DAVE ERICKSON	10/15/76	150	OPEN	90-150	60	LIMESTONE
98	24748	37N	11E	1 (SW)	(SV #2)10 S 526 GLENN(SW,NW,SW)	DONALD HALL	11/3/76	185	OPEN	130-185	130	LIMESTONE
99	25093	37N	11E	1 (SW)	SANITARY DIST. (AD LOT #61)	EDWARD McCLUSKY	5/27/77	190	OPEN	126-190	75	LIMESTONE
100	25094	37N	11E	1 (SW)	(SV #11)9532 HENNITTA(W/2,SW)	CARL RUMER	5/27/77	180	OPEN	126-180	78	LIMESTONE
101	25949	37N	11E	1 (SW)	NW 1/4 OF SW 1/4 OF SW 1/4	JOE DePAULO	7/6/79	160	OPEN	103-160	69	LIMESTONE
102	27215	37N	11E	1 (SW)	10 S 601 GARFIELD RD.(NE,NW,SW)	ROBERT BIAGETTI	10/22/85	125	OPEN	66-125	29	LIMESTONE
103	23616	37N	11E	1 (SW?)	ASSESSMENT DIVISION LOT #40	JERUTIS BLDRS.	2/11/74	125	OPEN	41-125	20	LIMESTONE
104	23617	37N	11E	1 (SW?)	ASSESSMENT DIVISION LOT #7	JERUTIS BLDRS.	2/18/74	150	OPEN	80-150	60	LIMESTONE
105	1112	37N	11E	1? (NE)	CVE #27 (SE,SE,NE)	TERRY HECTOR	1/30/68	74	OPEN	46-74	20	LIMESTONE

TABLE 4-9
LENZ OIL SITE
PRIVATE WELL DATA

ERM NO.	COUNTY NO.	TOWN-SHIP	RANGE	SEC(1/4)	LOCATION	OWNER	DATE COMPLETED	TOTAL DEPTH	SCREEN MATL.	SCREENED INTERVAL	STATIC WATER	GEOLOGIC MATERIAL
106		37N	11E	2 (NE)	16 W 140 89TH ST.(SE,NW,NE)	GARY KNOLBLOCH	10/12/82	220	OPEN	163-220	119	LIMESTONE
107	897	37N	11E	2 (NE)	9012 SKYLINE DR.(SW,SW,NE)	VIOLA WOLFF	8/14/67	192	OPEN	126-192	108	ROCK
108	1972	37N	11E	2 (NE)	(TSV) SKYLINE DR. (SW,NE)	HAZEL POKALL	1948	34	CEMENT	10-34		SAND/GVL
109	2131	37N	11E	2 (NE)	TSV LOT #13	PARK LANE REALTY	6/27/71	200	OPEN	150-200	78	ROCK
110	2310	37N	11E	2 (NE)	TRI-STATE VILLAGE LOT #12	W. WILLIAMSON	11/23/71	200	OPEN	158-200	88	ROCK
111	2357	37N	11E	2 (NE)	(TSV #24)8915 PALISADES(W/2,NE)	R. ZIMA	11/15/71	225	OPEN	170-225	149	ROCK
112	2963	37N	11E	2 (NE)	TSV LOT #4	BALDUCCI	9/19/72	160	OPEN	143-160	65	ROCK
113	3038	37N	11E	2 (NE)	TSV LOT #3	JOHN BRETZ	11/6/72	195	OPEN	175-195	78	ROCK
114	3211	37N	11E	2 (NE)	TRISTATE VILLAGE LOT #13	BALDUCCI	5/22/73	155	OPEN	118-155	80	ROCK
115	3275	37N	11E	2 (NE)	TSV LOT #5	PHIL BIESEMEYER	6/19/73	180	OPEN	144-180	60	ROCK
116	3276	37N	11E	2 (NE)	TSV LOT #6	PHIL BIESEMEYER	6/19/73	180	OPEN	138-180	60	ROCK
117	23566	37N	11E	2 (NE)	40 CUSTER ST. (NE,SE,NE)	ED JEANS	12/18/73	225	OPEN	137-225	160	LIMESTONE
118	23802	37N	11E	2 (NE)	143 HILLSIDE LANE (NW,NE)	JURE POZEK	8/27/74	220	OPEN	155-220	130	LIMESTONE
119	24059	37N	11E	2 (NE)	TSV LOT #15	EARL CLYDE	4/1/75	180	OPEN	125-180	33	LIMESTONE
120	24060	37N	11E	2 (NE)	8805 PALISADES (TSV #32)	RONALD MAROUSEK	4/2/75	205	OPEN	155-205	125	LIMESTONE
121	24319	37N	11E	2 (NE)	SE 1/4 OF SW 1/4 OF NE 1/4	JZ CONST.	11/20/75	180	OPEN	115-180	80	LIMESTONE
122	24450	37N	11E	2 (NE)	10 S 330 MADISON (SE,SE,NE)	DIORIO BLDRS.	3/29/76	175	OPEN	115-175	130	LIMESTONE
123	24580	37N	11E	2 (NE)	534 OGDEN (TSV LOT #19)	PARK LANE REALTY	5/4/76	180	STL CAS?	0-180	124	LIMESTONE
124	25015	37N	11E	2 (NE)	8700 S. COUNTY LINE (NW,SE,NE)	PAT ALDERTINI	12/2/76	205	OPEN	139-205	138	LIMESTONE
125	25225	37N	11E	2 (NE)	16 W 310 91ST (SW,SW,NE)	R.T. CHADNER	11/15/78	205	OPEN	150-205	115	LIMESTONE
126	25227	37N	11E	2 (NE)	16 W 184 89TH (SW,NE,NE)	LEAHY HOME BLDRS.	11/18/77	250	OPEN	153-250	147	LIMESTONE
127	25228	37N	11E	2 (NE)	10950 URSULA DR.(NW,NE,NE)	ST. & ASSOCS.	12/19/77	165	OPEN	155-165	98	LIMESTONE
128		37N	11E	2 (NW)	8101 COUNTY LINE RD.(W/2,NW)	GEORGE REDIEHS	4/15/77	125	OPEN	40-125	4	LIMESTONE
129		37N	11E	2 (NW)	17 STIRRUP CT. (TLE #47)	ROBERT DELMASTRO	7/18/79	220	OPEN	138-220	118	LIMESTONE
130	24749	37N	11E	2 (NW)	9053 O'NEIL (TLE #15)	RUDY DURHAM	9/30/76	200	OPEN	147-200	85	LIMESTONE
131	3230	37N	11E	2 (NW)	10 S 60 LAKEWOOD (TLE #55)	FRANK GAWEL	5/29/73	190	OPEN	137-190	90	LIMESTONE
132	3101	37N	11E	2 (NW)	TSV LOT #13	TOM FISHER	3/30/73	180	OPEN	160-180	80	ROCK
133	1147	37N	11E	2 (NW)	16 W 466 91ST ST. (S/2,NW)	JOSEPH BOBEK	3/14/69	190	OPEN	150-190	138	LIMESTONE
134	23995	37N	11E	2 (NW)	10 S 070 RTE.83 (NE,NE,NW)	GEORGE MATOCHA	2/5/75	205	OPEN	160-205	100	LIMESTONE
135	23996	37N	11E	2 (NW)	16 W 471 HILLSIDE (SE,NE,NW)	FRANK RUZICKA	2/6/75	205	OPEN	160-205	100	LIMESTONE
136	24750	37N	11E	2 (NW)	16 W 556 HILLSIDE (SE,NE,NW)	MELVIN MILLER	9/16/76	190	OPEN	135-190	80	LIMESTONE
137	83	37N	11E	2 (NW)	NE 1/4 OF SE 1/4 OF NW 1/4	A.J. BUILDERS	1957	175	OPEN	125-175	70	LIMESTONE
138	1062	37N	11E	2 (S/2)	SPACE VALLEY LOT #2	SEFARA BLDRS.	5/23/68	100	STL CAS?	0-100	90	SAND/GRAVEL
139	2356	37N	11E	2 (SE)	SPACE VALLEY LOT #24	CREATIVE BLDRS.	1/19/72	260	OPEN	119-260	88	ROCK
140	2473	37N	11E	2 (SE)	16 W 125 89TH (SE,NE,SE)	JOSEPH DACKA	3/11/72	240	OPEN	142-240	79	ROCK

TABLE 4-9
LENZ OIL SITE
PRIVATE WELL DATA

ERM NO.	COUNTY NO.	TOWN-SHIP	RANGE	SEC(1/4)	LOCATION	OWNER	DATE COMPLETED	TOTAL DEPTH	SCREEN MATL.	SCREENED INTERVAL	STATIC WATER	GEOLOGIC MATERIAL
141	2480	37N	11E	2 (SE)	SPACE VALLEY SUBD. LOT #7	BOLT BROS.	5/31/72	126	OPEN	120-126	60	ROCK
142	25224	37N	11E	2 (SE)	NE 1/4 OF SE 1/4 OF SE 1/4	ROBERT BAKER	8/24/77	200	OPEN	147-200	34	ROCK
143	25226	37N	11E	2 (SE)	10 S 934 MADISON (SE,SE,SE)	HANDCRAFTED HOMES	11/28/78	200	OPEN	127-200	115	LIMESTONE
144	27540	37N	11E	2 (SE)	10420 S. KNOX (SW,SE,SE)	ROBERT SWAYKA	1/27/87	180	OPEN	130-180	85	ROCK
145	1161	37N	11E	2 (SE)	CENTER OF NW 1/4 OF SE 1/4	FRED LENZ	7/15/68	205	OPEN	140-205	90	NIAG LS
146	1162	37N	11E	2 (SE)	CENTER OF NW 1/4 OF SE 1/4	WINSTON LENZ	8/1/68	205	OPEN	140-205		NIAG LS
147	2069	37N	11E	2 (SE)	94TH & JACKSON (SW,SW,SE)	RELIABLE CONST.	3/23/71	180	OPEN	162-180	79	ROCK
148	2132	37N	11E	2 (SE)	16 W 375 94TH ST.(SW,SW,SE)	RELIABLE CONST.	7/16/71	180	OPEN	160-180	139	ROCK
149	2474	37N	11E	2 (SE)	16 W 185 89TH ST.(SE,NW,SW)	JOSEPH SERAFIN	5/23/72	240	OPEN	138-240	79	ROCK
150	3039	37N	11E	2 (SE)	OAK HILL ESTATES LOT #14	RELIABLE CONST.	10/27/72	190	OPEN	150-190	28	ROCK
151	3095	37N	11E	2 (SE)	94TH & OAK HILL (OH LOT #9)	NICK BATISTICH	1/19/73	140	OPEN	111-140	89	ROCK
152	3167	37N	11E	2 (SE)	OAK HILL ESTATES LOT #25	RELIABLE CONST.	4/19/73	180	OPEN	166-180	60	ROCK
153	3394	37N	11E	2 (SE)	OAK HILL LOT #19	PARRISH CONST.	10/5/73	160	OPEN	147-160	60	ROCK
154	23618	37N	11E	2 (SE)	16 W 253 94TH ST (OH #12)	JAMES McGUIRE	12/10/73	200	OPEN	147-200	129	ROCK
155	23694	37N	11E	2 (SE)	16 W 302 W 94TH ST.(SE,NW,SE)	TIM ZANGRI	5/10/74	180	OPEN	137-180	58	ROCK
156	23741	37N	11E	2 (SE)	510 DOWNERS DR.(OAK HILL #7)	NICK BATISTICH	5/24/74	190	OPEN	128-190	75	LIMESTONE
157	23864	37N	11E	2 (SE)	OAK HILL ESTS. LOT #3 (NW,SW,SE)	DENNIS BUMBER	9/6/74	170	OPEN	160-170	78	LIMESTONE
158	24229	37N	11E	2 (SE)	(OH #1) 93RD PLACE (SW,SE)	BLDG. & CONST.	9/23/75	190	OPEN	130-190	115	LIMESTONE
159	27472	37N	11E	2 (SE)	16 W 300 94TH PL.(SE,SW,SE)	NEDELJKO NIHOLIC	8/29/86	205	OPEN	145-205	139	LIMESTONE
160	27473	37N	11E	2 (SE)	382 LORCH (SE,SW,SE)	RICHARD SABLICK	2/12/87	180	OPEN	126-180	79	ROCK
161	27653	37N	11E	2 (SE)	OAK HILL #10 (SW,SW,SE)	WARTHEN PUMP	5/1/87	205	OPEN	153-205	109	LIMESTONE
162	27701	37N	11E	2 (SE)	2650 BREWER LANE (SE,SW,SE)	CALLAHAN & ASSOC.	4/13/87	180	OPEN	120-180	79	ROCK
163	27791	37N	11E	2 (SE)	16 W 267 94TH ST.(SE,SW,SE)	DEBBIE ROCKABRAND	6/3/87	180	OPEN	148-180	79	ROCK
164	28092	37N	11E	2 (SE)	16 W 267 93RD (SE,NW,SE)	BILL ALLEN BLDRS.	2/22/83	180	OPEN	132-180	99	ROCK
165	28204	37N	11E	2 (SE)	2927 S. 48TH AVE.(NW,SW,SE)	BILL CARSTEN	6/16/88	200	OPEN	145-200	89	LIMESTONE
166		37N	11E	2 (SW)	10 S 731 JACKSON ST.(SE,NW,SW)	CHESTER GASAWAY	5/7/80	220	OPEN	160-220	130	LIMESTONE
167	63	37N	11E	2 (SW)	NW 1/4 OF NW 1/4 OF SW 1/4	RAMLIN ROSE SOUTH	7/18/67	1610	OPEN	512-1610	594	LS/SH/SS
168	907	37N	11E	2 (SW)	NW 1/4 OF NW 1/4 OF SW 1/4	RAMLIN ROSE SOUTH	1967	249	OPEN	108-249	78	LIMESTONE
169	2058	37N	11E	2 (SW)	NW 1/4 OF NE 1/4 OF SW 1/4	RAMBLIN ROSE	10/4/70	300	OPEN	120-300	77	LS/SH
170	2339	37N	11E	2 (SW)	16 W 301 94TH ST. (S/2,S/2)	ROBERT HABADA	1/3/72	220	OPEN	156-220	78	ROCK
171	25223	37N	11E	2 (SW)	9454 S. JACKSON	DENNIS ANDRYSIAK	9/14/78	180	OPEN	150-180	45	LIMESTONE
172		37N	11E	3 (NE)	16 W 451 HILLSIDE (SW,NW,NE)	HANS DEV. CO.	7/1/89	220	OPEN	140-220	100	LIMESTONE
173	503	37N	11E	3 (NE)	TIMBERLAKE ESTS. #94 (NE,NE,NE)	HENRY JOUKEMA	1959	191	OPEN	153-191	90	LIMESTONE
174	1567	37N	11E	3 (NE)	10 S. 140 LEONARD (SW,NW,NE)	IVAN PUMMEL	1966	150	OPEN	115-150	55	LIMESTONE
175	2088	37N	11E	3 (NE)	TIMBERLAKE ESTS. #38 (NE,NE,NE)	CHESTER GASAWAY	7/13/71	150	OPEN	130-150	40	ROCK
176	23803	37N	11E	3 (NE)	17 W 268 HILLSIDE (SW,NE,NE)	WILLIAM CALABRETTA	8/22/74	190	OPEN	136-190	75	LIMESTONE
177	25230	37N	11E	3 (NE)	4736 MAIN ST. (TLE #88)	KELLOG-BENET BLDR.	5/20/78	160	OPEN	147-160	78	LIMESTONE
178	27078	37N	11E	3 (NE)	17 W 155 W. 87TH ST. (NE,NE)	GEORGE SKUDRNA	6/24/85	200	OPEN	150-200	99	LIMESTONE
179	28002	37N	11E	3 (NE)	4741 CUMNOR RD. (NE,NE,NE)	JACK SPINNEY	10/26/87	200	STL CAS?	0-200	89	LIMESTONE
180	28429	37N	11E	3 (NE)	NE 1/4 OF NW 1/4 OF NE 1/4	DAVE KELLEY	12/4/84	245	OPEN	145-245	50	LIMESTONE
181	24320	37N	11E	3 (NW)	10 S 020 LORRAINE (N/2,NE,NW)	ACCURATE DESIGN	11/5/75	200	OPEN	148-200	90	LIMESTONE

TABLE 4-9
LENZ OIL SITE
PRIVATE WELL DATA

ERM NO.	COUNTY NO.	TOWN-SHIP	RANGE	SEC(1/4)	LOCATION	OWNER	DATE COMPLETED	TOTAL DEPTH	SCREEN MATL.	SCREENED INTERVAL	STATIC WATER	GEOLOGIC MATERIAL
182	25229	37N	11E	3 (NW)	16 W 424 HILLSIDE (SE,NE,NW)	NICK BATISTICH	10/20/77	220	OPEN	147-220	150	LIMESTONE
183	27543	37N	11E	3 (NW)	NW 1/4 OF NW 1/4 OF NW 1/4	DU PAGE CO.	10/20/86	325	OPEN	101-325		LS/SH
184		37N	11E	3 (SE)	87TH ST. S. OF HINSDALE (NW,SE)	MAXWELL HOWARD	1932	138	OPEN	126-138		ROCK
185	24381	37N	11E	3 (SE)	NW 1/4 OF NW 1/4 OF SE 1/4	DU PAGE CO. FOREST	4/28/76	150	OPEN	105-150		LIMESTONE
186		37N	11E	3 (SW)	87TH ST. S. OF HINSDALE (NE,SW)	LOUIS REDIEHS		103	OPEN	86-103		ROCK
187		37N	11E	3 (SW)	DU PAGE CO. (SE,SW)	ARNOLD REDISH	1924	91	OPEN	69-91		ROCK
188		37N	11E	3 (SW)	DU PAGE CO. (SE,SW)	MALIKOWSKI	1914	85	OPEN	63-85	13	ROCK
189		37N	11E	3 (SW)	DU PAGE CO. (NE,SW)	SMITH		100	OPEN	96-100		ROCK
190	654	37N	11E	3 (SW)	NE 1/4 OF SW 1/4 OF SW 1/4	ARGONNE LAB		110	OPEN?	80-110	37	LIMESTONE
191	1566	37N	11E	3 (SW)	SW 1/4 OF SW 1/4 OF SW 1/4	ARGONNE LAB	1950	1595	OPEN?	64-1595		LS/SH/SS
192		37N	11E	4 (NE)	ARGONNE LAUNCHER AREA (NE,NE)	U.S. ARMY	1955	230	OPEN	140-230		
193		37N	11E	4 (NE)	881 W ST CHARLES RD.(NE,SE,NE)	FOREST PRESERVE	11/15/78	150	OPEN	110-150	58	LIMESTONE
194	1568	37N	11E	4 (NE)	DOWNER'S GROVE TWP. (NW,NW,NE)	WELCH		115				ROCK
195	218	37N	11E	4 (SE)	NE 1/4 OF SW 1/4 OF SE 1/4	ARGONNE LAB	2/59	341	OPEN	115-341	84	SIL/ORD DOL
196	656	37N	11E	9 (NE)	SW 1/4 OF SE 1/4 OF NE 1/4	ARGONNE LAB		186	OPEN	86-186		LIMESTONE
197	1571	37N	11E	9 (NE)	NE 1/4 OF NW 1/4 OF NE 1/4	ARGONNE LAB	6/64	331	OPEN	110-331	88	LS/SH
198	1572	37N	11E	9 (NE)	NE 1/4 OF NW 1/4 OF NE 1/4	ARGONNE LAB	6/64	331	OPEN	108-331	85	LS/SH
199	658	37N	11E	9 (SE)	SW 1/4 OF NW 1/4 OF SE 1/4	ARGONNE LAB		141	OPEN	86-141	101	LIMESTONE
200	659	37N	11E	9 (SE)	NE 1/4 OF NE 1/4 OF SE 1/4	ARGONNE LAB	1940	240	OPEN?	95-240	60	LIMESTONE
201	660	37N	11E	9 (SE)	NE 1/4 OF SE 1/4 OF SE 1/4	ARGONNE LAB	1921	148	OPEN?	86-148	111	LIMESTONE
202	661	37N	11E	9 (SE)	NE 1/4 OF SE 1/4 OF SE 1/4	ARGONNE LAB	1934	111	OPEN?	91-111		LIMESTONE
203	662	37N	11E	10 (NW)	NW 1/4 OF SE 1/4 OF NW 1/4	ARGONNE LAB	1934	97	OPEN?	63-97	22	LIMESTONE
204	664	37N	11E	10 (NW)	SE 1/4 OF SE 1/4 OF NW 1/4	ARGONNE LAB		160	OPEN	160-168		LIMESTONE
205	665	37N	11E	10 (NW)	NW 1/4 OF SW 1/4 OF NW 1/4	ARGONNE LAB		168	OPEN?	160-168	52	LIMESTONE
206	1509	37N	11E	10 (NW)	SW 1/4 OF NE 1/4 OF NW 1/4	ARGONNE LAB	1948	300	OPEN	61-300	70	SIL/ORD LS/SH
207	1510	37N	11E	10 (NW)	NE 1/4 OF SE 1/4 OF NW 1/4	ARGONNE LAB	1948	284	OPEN	75-284	75	SIL/ORD LS
208	2395	37N	11E	10 (NW)	SW 1/4 OF SW 1/4 OF NW 1/4	ARGONNE LAB		202	OPEN?	140-202	69	LIMESTONE
209	26215	37N	11E	10 (SE)	12 W LAKE ST.(SE,NW,SE)	DU PAGE CO.	3/5/81	200	OPEN	77-200	59	ROCK/SH
210	26216	37N	11E	10 (SE)	12 W LAKE ST.(SE,NW,SE)	DU PAGE CO.	1/23/81	160	OPEN	70-160	59	ROCK
211	663	37N	11E	10 (SW)	NW 1/4 OF SE 1/4 OF SW 1/4	ARGONNE LAB		95	OPEN?	50-95	72	LIMESTONE
212	714	37N	11E	10 (SW)	SW 1/4 OF SW 1/4 OF SW 1/4	ARGONNE LAB	1949	155	OPEN	115-155	107	LIMESTONE
213	510	37N	11E	11 (NE)	ASSESSMENT DIV. (SW,SW,NE)	ALLAN BECKMAN	1959	155	OPEN	105-155	80	LIMESTONE
214	1262	37N	11E	11 (NE)	11519 ROSEMERE (NE,NE,NE)	EDWARD OTTO	11/29/69	180	OPEN	100-180	115	LIMESTONE
215	1276	37N	11E	11 (NE)	16 W 220 97TH (SE,NW,NE)	CARL PETERSON	9/10/69	150	OPEN	115-150	90	LIMESTONE

TABLE 4-9
LENZ OIL SITE
PRIVATE WELL DATA

ERM NO.	COUNTY NO.	TOWN-SHIP	RANGE	SEC(1/4)	LOCATION	OWNER	DATE COMPLETED	TOTAL DEPTH	SCREEN MATL.	SCREENED INTERVAL	STATIC WATER	GEOLOGIC MATERIAL
216	2268	37N	11E	11 (NE)	ASSESSMENT DIV.LOT #47 (SE,NE)	TONY ADRECUS	10/13/71	180	OPEN	142-180	78	ROCK
217	2981	37N	11E	11 (NE)	ASSESSMENT LOT #38 (SE,NW,NE)	RICHARD FLACS	9/27/72	180	OPEN	96-180	60	ROCK
218	3319	37N	11E	11 (NE)	SPRING ACRES #2 (LOT #5)	ARAZAN BLDRS.	7/30/73	190	OPEN	137-190	40	ROCK
219	3320	37N	11E	11 (NE)	SPRING ACRES LOT #4	JOHN HUSEK	7/30/73	185	OPEN	137-185	80	ROCK
220	23620	37N	11E	11 (NE)	11 S 058 PALISADES (N/2,NE)	C. SROKA	12/10/73	180	OPEN	140-180	129	ROCK
221	23696	37N	11E	11 (NE)	11 S 060 MADISON (NE,NE,NE)	RELIABLE CONST.	4/3/74	140	OPEN	66-140	50	LIMESTONE
222	23828	37N	11E	11 (NE)	11 S 204 MADISON (NE,NE)	JOHN MANGAN	7/31/74	100	OPEN	84-100	63	LIMESTONE
223	23997	37N	11E	11 (NE)	11 S 375 JEANS RD.(LOT #41)	RICHARD FLACS	12/13/74	100	OPEN	40-100	33	LIMESTONE
224	23998	37N	11E	11 (NE)	EDW. SASS ASSESS. (NE,NE,NE)	NICK MICHAELS	12/19/74	145	OPEN	84-145	58	LIMESTONE
225	24232	37N	11E	11 (NE)	10 S 571 MADISON (ES #34)	NICK MICHAELS	9/24/75	150	OPEN	105-150	60	LIMESTONE
226	25096	37N	11E	11 (NE)	ASSESSMENT DIV. (LOT #41)	TRISKA & FLACS	5/31/77	100	OPEN	40-100	8	LIMESTONE
227	25239	37N	11E	11 (NE)	16 W 235 97TH (NE,SW,NE)	CHESTER GASAWAY	10/18/77	130	OPEN	80-130	5	LIMESTONE
228	26217	37N	11E	11 (NE)	9700 S. MADISON (SE,SE,NE)	JOHN COURTNEY	10/9/79	145	OPEN	42-145	7	LIMESTONE
229	26219	37N	11E	11 (NE)	1138 TIMBER LANE (JEANS RD SUB)	EARL MAIER	11/12/80	110	OPEN	40-110	5	LIMESTONE
230	26220	37N	11E	11 (NE)	11 S 010 JACKSON ST.(NW,NW,NE)	EMILIE RANNIN	9/24/81	185	OPEN	140-185	119	LIMESTONE
231	26356	37N	11E	11 (NE)	SPRING ACRES LOT #6 (NW,NE)	DON SCHULTZ	9/11/84	185	OPEN	132-185	99	LIMESTONE
232	944	37N	11E	11 (SE)	DU PAGE CO.? (NE,NW,SE)	THOMAS REDIEHS	1967	100	OPEN	43-100	20	LIMESTONE
233	27164	37N	11E	11 (SE)	JEANS RD? (SE,NW,SE)	CORWIN LENZ	9/13/85	125	OPEN	42-125	14	LIMESTONE
234	1275	37N	11E	11 (SW)	16 W 515 99TH ST.(SE,NE,SW)	NICK BATISTICH	11/13/69	165	OPEN	133-165	105	LIMESTONE
235	26218	37N	11E	11 (SW)	NW 1/4 OF NW 1/4 OF SW 1/4	DU PAGE CO.	1/14/83	200	OPEN	75-200	39	ROCK
236	2949	37N	11E	12 (NW)	SPACE VALLEY SUB. (LOT #13)	SEFARA BLDRS.	7/13/72	180	OPEN	132-180	60	ROCK
237	23804	37N	11E	12 (NW)	11 S 165 MADISON (NW,NW,NW)	JIM ADCOCK	8/22/74	120	OPEN	52-120	8	LIMESTONE
238	25097	37N	11E	12 (NW)	8101 COUNTY LINE RD.(W/2,NW)	GEORGE REDIEHS	4/15/77	125	OPEN	40-125	4	LIMESTONE
239	26221	37N	11E	12 (SW)	TREATMENT PLANT (NW,NW,SW)	DU PAGE CO.	11/21/83	145	OPEN	32-145	5	LIMESTONE
240	28430	37N	11E	12 (SW)	15700 S. LaGRANGE RD.(NW,NW,SW)	KERR TRAILER	1/9/85	150	OPEN	40-150	4	ROCK
241		37N	11E	13 (NW)		MURPHY	1947	75	OPEN?	31-75		ROCK
242		37N	11E	13 (NW)		TOM MURPHY		79	OPEN?	31-79		ROCK
243		37N	11E	13 (NW)		TOM MURPHY		92	OPEN?	55-92		ROCK
244		37N	11E	13 (SW)		GEORGE RENBONE		40	OPEN?	5-40		ROCK
245		37N	11E	13 (SW)	SAG BRIDGE	AMY KIRK		68	OPEN?	13-68		ROCK
246		37N	11E	13 (SW)		SAG SCHOOL	1915	69	OPEN	20-69		ROCK
247		37N	11E	14 (NE)	117TH & ARCHER (NW,SE,NE)	HILDA KIRK	7/28/71	70	OPEN	40-70	44	LS/SH
248		37N	11E	14 (NE)	LEMONT TWP.	HEYWORTH	1915	35	OPEN	27-35		ROCK
249		37N	11E	14 (NE?)	CONST. CAMP FOR CANAL	HEYWORTH	1915	49	OPEN	27-49		ROCK
250		37N	11E	14 (NW)		M. POLAREK	1926	58	OPEN	26-58		ROCK

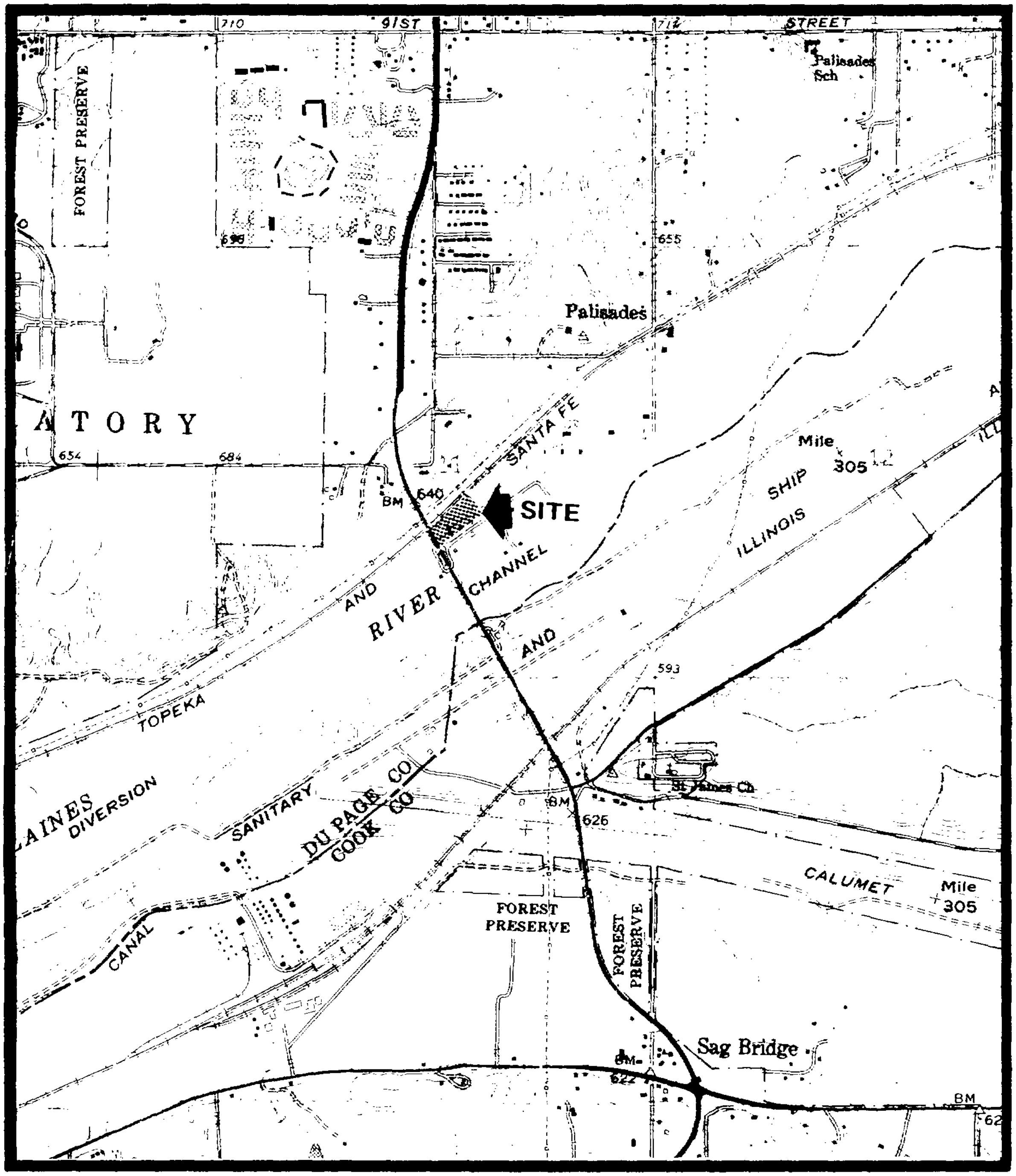
TABLE 4-9
LENZ OIL SITE
PRIVATE WELL DATA

ERM NO.	COUNTY NO.	TOWN-SHIP	RANGE	SEC(1/4)	LOCATION	OWNER	DATE COMPLETED	TOTAL DEPTH	SCREEN MATL.	SCREENED INTERVAL	STATIC WATER	GEOLOGIC MATERIAL
251	10 - 16	37N	11E	14 (NW)	CAL-SAG CHANNEL:7 SITES (S/2,NW)	CORPS OF ENGRS.	<10/1/46	22-26	BORINGS			LIMESTONE
252		37N	11E	14 (S/2)	CHICAGO-JOLIET RD.(S/2,S/2)	AL ALBRECHT	3/10/75	120	OPEN	63-120	50	LIMESTONE
253		37N	11E	14 (SE)	111TH & ARCHER	MRS. RUPERT	1913	60	OPEN	22-60		ROCK
254	28597	37N	11E	15 (NE)	5925 BENTLEY (NE,SE,NE)	JAMES TILLEY	8/21/84	240	OPEN	132-240	129	ROCK
255		37N	11E	15 (SE)	JOESEPH N. PEW'S SUBD. (LOT #3)	JIM ADCOCK	12/20/78	105	OPEN	40-105	3	LIMESTONE
256	26981	37N	11E	15 (SE)	LEMONT HIGHWAY RD. (SE,SE,SE)	JOHN DEYOUND	8/22/85	145	OPEN	40-145	19	LIMESTONE
257	786-792	37N	11E	15 (SE?)	DU PAGE CO.? - 7 SITES	N. IL GAS CO.	10/62	28-90	BORINGS?			LIMESTONE
258		37N	11E	15 (SW)	BURR RIDGE (NW,SW,SW)	GENE VINEYARD	3/20/81	105	OPEN	42-105	9	LIMESTONE
259	1457	37N	11E	16 (SE)	SW 1/4 OF SW 1/4 OF SE 1/4	RICHMOND BUILDERS	12/13/70	160	OPEN	127-160	18	ROCK
260		37N	11E	22 (NE)		JOHN McGRAW	1916	100	OPEN	65-100		ROCK
261		37N	11E	22 (NE)	1598 MAIN ST. (SE,NW,NE)	COUNTRY CLUB	5/17/77	151	OPEN	77-151	65	LIMESTONE
262	27102	37N	11E	22 (NW)	NW 1/4 OF NW 1/4 OF NW 1/4	PATRICIA STRADER	8/5/85	100	OPEN	40-100	19	ROCK
263	29293	37N	11E	22 (NW)	1134 KOTLEN (NW,NW)	RONALD BUSHMAN	9/18/84	180	OPEN	40-180	39	ROCK
264	29294	37N	11E	22 (NW)	114TH ST & WALKER RD.(SW,SW,NW)	NEIL LINDBERG	10/17/79	180	OPEN	50-180	19	ROCK
265	29296	37N	11E	22 (NW)	1349 MAGIN ST. (NW,SW,NW)	EMITY McCUTCHEON	9/17/81	225	OPEN	42-225	39	LS/SH
266		37N	11E	23 (NE)	LEMONT TWP.	P.J. RUPERT	1907	200	OPEN	77-200	>75	ROCK
267		37N	11E	23 (NE)	LEMONT TWP.(NE,NE)	CONWAY	11/3/47	200				
268		37N	11E	23 (NE)	16 ARTESIAN-AG #16 (E/2, NE)	NICK BATISTICH	11/16/72	140	OPEN	88-140	79	ROCK
269	766	37N	11E	23 (NE)	ARCHER & BELL (E/2, NE)	E. BELGRAVE	10/8/68	115	OPEN	81-115	59	ROCK
270	1374	37N	11E	23 (NE)	AG LOT #28 (SW,SE,NE)	RAY RUDIS BLDRS.	9/6/71	150	OPEN	85-150	59	ROCK
271	1523	37N	11E	23 (NE)	RTE. 1 WOODLANE AVE.(SW,SW,NE)	KETTELL CONST.	3/24/72	135	OPEN	85-135	74	LIMESTONE
272	1644	37N	11E	23 (NE)	CAMPBELL ST LOT #30 (NE,SE,NE)	JAMES DEMPSEY	11/17/71	160	OPEN	84-160	59	ROCK
273	4416	37N	11E	23 (NE)	ARCHER GARDENS LOT #51	CHESTER GASAWAY	8/3/73	120	OPEN	80-120	40	ROCK
274	25384	37N	11E	23 (NE)	BELL & CAMPBELL RDS.(NE,SE,NE)	ALLEN HULL BLDRS.	6/7/76	100	OPEN	70-100	49	ROCK
275	25812	37N	11E	23 (NE)	AG LOT #50 (E/2, NE)	ROBERT KOLODMNSKI	7/28/77	215	OPEN	82-215	59	ROCK
276	26306	37N	11E	23 (NE)	ARCHER GARDENS LOT #2(NW,SE,NE)	FRANK PICK	9/19/77	185	OPEN	90-185	82	LIMESTONE
277		37N	11E	23 (NE?)	ARCHER GARDENS LOT #38	WOHEAD BLDRS.	6/27/73	130	OPEN	70-130	55	LIMESTONE
278		37N	11E	23 (NW)	113TH PL. & BELL RD.(E/2,NW)	K.V. BLDRS.	11/2/74	170	OPEN	100-170	64	ROCK
279	2087	37N	11E	23 (NW)	SE 1/4 OF SE 1/4 OF NW 1/4	COUNTRY CLUB	7/63	297	OPEN	87-297	52	LS/SH
280	2088	37N	11E	23 (NW)	SW 1/4 OF SW 1/4 OF NW 1/4	COUNTRY CLUB	10/20/66	300	OPEN	60-200	43	LS/SH
281		37N	11E	23 (SW)	LEMONT TWP.	JOHN DOMINICK	1915	150	OPEN	115-150	50	ROCK
282	585	37N	11E	23 (SW)	SE 1/4 OF NW 1/4 OF SW 1/4	COUNTRY CLUB	10/20/67	335	OPEN	112-335	73	LIMESTONE
283	29297	37N	11E	23 (SE)	BELL RD. (SE,NE,SE)	JOE KEIM BLDRS.	1/10/80					

TABLE 4-9
LENZ OIL SITE
PRIVATE WELL DATA

ERM NO.	COUNTY NO.	TOWN-SHIP	RANGE	SEC(1/4)	LOCATION	OWNER	DATE COMPLETED	TOTAL DEPTH	SCREEN MATL.	SCREENED INTERVAL	STATIC WATER	GEOLOGIC MATERIAL
284	2089	37N	11E	24 (N/2)	RTE. 83 E. SAG BRIDGE (N/2,N/2)	CCC CAMP AT LEMONT	1944	160	OPEN	53-160	35	LIMESTONE
285		37N	11E	24 (NW)	LEMONT TWP. (SW,NW)	PETE MICHEK	1913	135	OPEN	89-135		ROCK
286		37N	11E	24 (NW)	LEMONT TWP. (NE,NW)	L. MATHY	1927	130	OPEN	50-130	25	ROCK
287		37N	11E	24 (NW)	LEMONT TWP. (NW,NW)	JOHN JALINSKI	1915	33	OPEN	30-33		BKN LIME
288		37N	11E	24 (NW)	59 RUSTY RD.(SW,SE,NW)	BILL RIORDAN	9/9/88	205	OPEN	79-205	69	LIMESTONE
289		37N	11E	24 (NW)	EQUEST. ESTS. LOT #94	BIG M BLDRS.	12/3/79	155	OPEN	63-155	49	ROCK
290	25386	37N	11E	24 (NW)	DINEFF & PISHONS (NW,NW,NW)	NICK BATISTICH	10/13/76	180	OPEN	52-180	43	LIMESTONE
291	25814	37N	11E	24 (NW)	115TH & DINEFF (S/2,SW,NW)	DAN BENIGNE	5/26/78	160	OPEN	73-160	100	LIMESTONE
292	26117	37N	11E	24 (NW)	RTE 83 & ARCHER & 111TH (NW,NW)	KORZENECHI & CO.	10/17/78	155	OPEN	42-155	29	LIMESTONE
293	26309	37N	11E	24 (NW)	BELL RD. & RTE. 171 (NW,NW,NW)	JOE ROGOWSKI	5/5/78	185	OPEN	55-185	44	LIMESTONE
294	27132	37N	11E	24 (NW)	EE LOT #139	OVERSTREET BLDRS.	9/16/85	160	OPEN	130-160	89	LIMESTONE
295	27193	37N	11E	24 (NW)	113TH & DINEFF (SW,SW,NW)	FRANK HART	2/19/86	205	OPEN	63-205	54	LS/SH
296	27215	37N	11E	24 (NW)	EQUESTRIAN LOT #151 (NE,NW,NW)	DENNIS IRELAND	12/4/85	185	OPEN	98-185	49	LIMESTONE
297	27473	37N	11E	24 (NW)	115TH DINEFF (SW,SW,NW)	SCOTT OLDANI	7/9/87	200	OPEN	63-200	44	LIMESTONE
298	27504	37N	11E	24 (NW)	EQUEST. ESTS.#97 (SE,NW,NW)	JOHN FARANO	7/10/87	205	OPEN	60-205	29	LIMESTONE
299	28203	37N	11E	24 (NW)	EE LOT #13 (SW,SE,NW)	KEN LARIMER	10/15/87	205	OPEN	91-205	49	LIMESTONE
300	28232	37N	11E	24 (NW)	7560 BLAZER AVE.(NW,NW,NW)	FRED FIERKE	7/14/88	200	OPEN	60-200	79	ROCK
301	28608	37N	11E	24 (NW)	17239 OAK PARK (NW,NW,NW)	STARK CONST.	11/28/88	300	OPEN	146-300	79	ROCK
302	28678	37N	11E	24 (NW)	1052 REPUBLIC DR.(SW,SW,NW)	MARK WILSON	6/17/88	220	OPEN	101-220	42	LIMESTONE
303	29819	37N	11E	24 (NW)	EE LOT #95 (NW,SE,NW)	B & K DEVLP.	5/8/80	220	OPEN	65-220	59	ROCK
304		37N	11E	24 (SW)	EE LOT #64 (NW,NW,SW)	MIKE WITT	2/15/80	185	OPEN	132-180	69	ROCK
305		37N	11E	24 (SW)	EE LOT #8 (NW,NW,SW)	DONNA KRAMER	4/5/79	200	OPEN	101-200	49	LIMESTONE
306	2090	37N	11E	24 (SW)	LEMONT TWP.(NW,NE,SW)	MIKE FLYNN	1939	260	OPEN?	100-260	45	ROCK
307	25816	37N	11E	24 (SW)	EE LOT #28 (NW,NW,SW)	CULTRA CONST.	7/13/78	185	OPEN	118-185	89	LIMESTONE
308	29303	37N	11E	24 (SW)	EE LOT #8 (NW,NW,SW)	DONNA KRAMER	4/4/79	200	OPEN	105-200	74	LIMESTONE
309	29311	37N	11E	24 (SW)	EE LOT #26 (NW,NW,SW)	CARL RUMER	1/9/80	140	OPEN	116-140	74	ROCK
310	29313	37N	11E	24 (SW)	16210 OAK VALLEY TR.(NE,NW,SW)	LATEERA BLDRS.	6/15/69	165	OPEN	126-165	89	LIMESTONE

SAG BRIDGE QUADRANGLE
ILLINOIS
7.5 MINUTE SERIES (TOPOGRAPHIC)
1963
PHOTOREVISED 1973
PHOTOINSPECTED 1978



SCALE 1:24000
1 .5 0 1 MILE

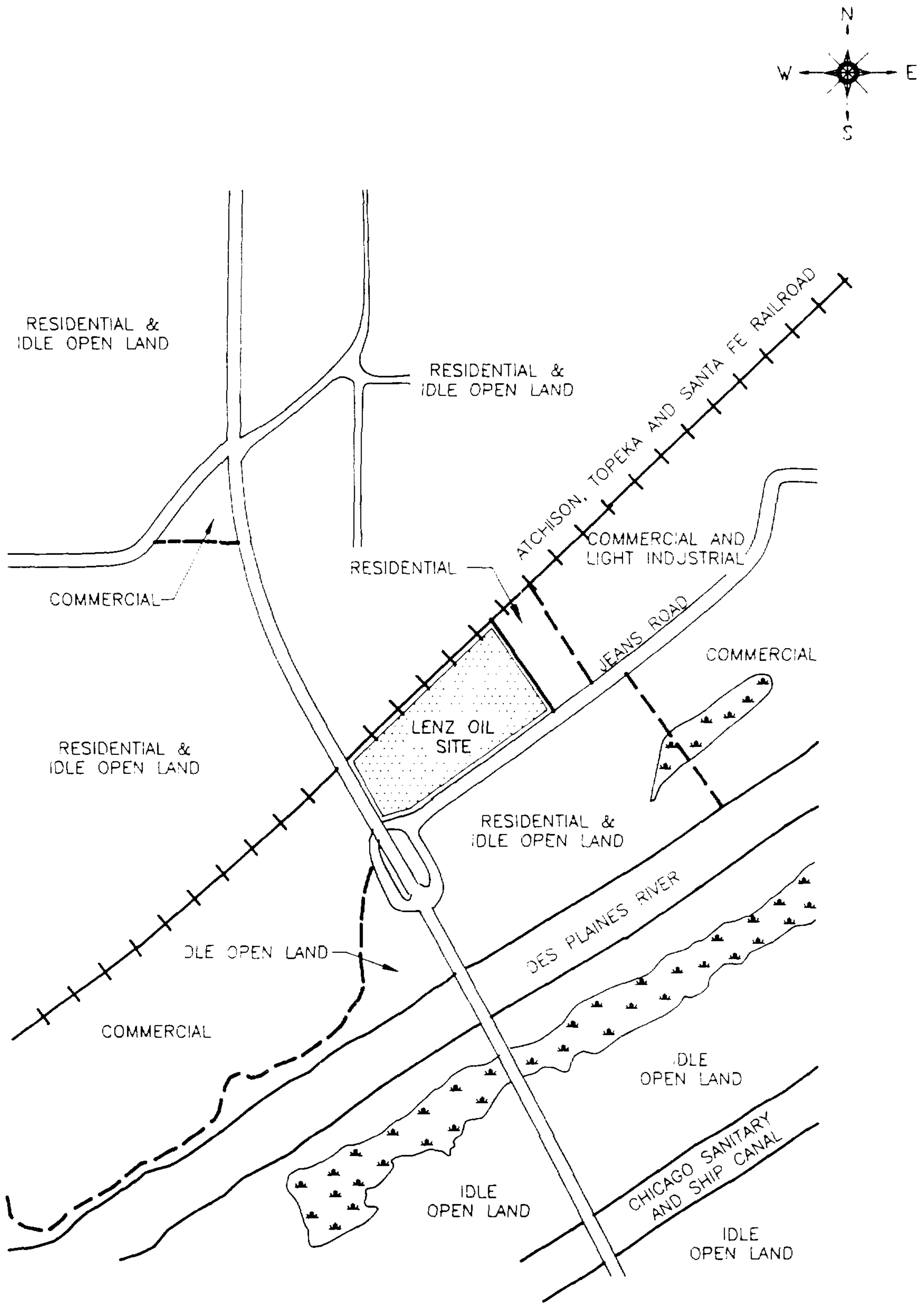
CONTOUR INTERVAL 5 FEET

FIGURE 2-1

SITE LOCATION MAP
LENZ OIL SITE

PROJECT: 0252 | REPORT: TM1 | DRAWN: BLAS | CHECKED: | DATE: 5/1/91 | APPROVED: | CLIENT NAME: LENZ OIL

ERM



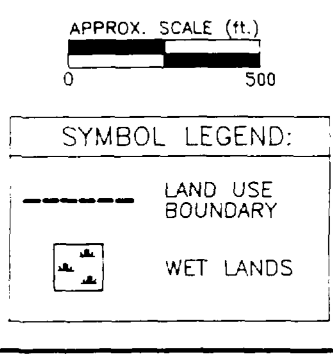


FIGURE 2-3

LAND USE MAP
LENZ OIL SITE

PROJECT: 0252 REPORT: TM1 DRAWN: MO- CHECKED: DATE: 2/1/91 APPROVED:

ERM

Time Stratig. System	Series	Stage	Rock Stratigraphy Megagroup	Group	Formation	Graphic Column	Thickness (Feet)	Kinds of Rock
QUAT	PLEIS				(See fig 5)		0-350	Till, sand, gravel, silt, clay, peat, marl, loess
PENN	DESM			Kewanee	Carbondale		0-125	Shale, sandstone, thin limestone, coal
					Spoon		50-75	As above, but below No. 2 Coal
MISS	VAL.				Burl.-Keokuk		0-700	Limestone — Only in Des Plaines Disturbance
	KIND.				Hannibal			Shale, siltstone
DEV.	UP.				Grassy Creek		0-5	Shale in solution cavities in Silurian
SILURIAN	NIAGARAN		Hunton		Racine		0-300	Dolomite, pure in reefs; mostly silty, argillaceous, cherty between reefs
					Waukesha		0-30	Dolomite, even bedded, slightly silty
					Joliet		40-60	Dolomite, shaly and red at base; white, silty, cherty above; pure at top
					Kankakee		20-45	Dolomite; thin beds; green shale partings
	ALEX				Edgewood		0-100	Dolomite, cherty, shaly at base where thick
ORDOVICIAN	CIN.	RICH		Maquoketa	Neda		0-15	Oolite and shale, red
					Brainard		0-100	Shale, dolomitic, greenish gray
					Ft Atkinson		5-50	Dolomite, green shale, coarse limestone
		MAY / ED.			Scales		90-120	Shale, dolomitic, gray, brown, black
	CHAMPLAINIAN	TRENT	Ottawa	Galena	Wise Lake		170-210	Dolomite, buff, pure
					Dunleith			Dolomite, pure to slightly shaly; locally limestone
					Guttenberg		0-15	Dolomite; red specks and shale partings
		BLACKRIVERAN		Platteville	Nachusa		0-50	Dolomite and limestone, pure, massive
					Grand Detour		20-40	Dolomite and limestone; medium beds
					Mifflin		20-50	Dolomite and limestone, shaly, thin beds
					Pecatonica		20-50	Dolomite, pure, thick beds
				Ancell	Glenwood		0-80	Sandstone and dolomite, silty; green shale
					St. Peter		100-600	Sandstone, medium and fine grained; well rounded grains, chert rubble at base
	CANADIAN		Knox	Prairie du Chien	Shakopee		0-70	Dolomite, sandy; oolitic chert; algal mounds
					New Richmond		0-35	Sandstone, fine to coarse
					Oneota		190-250	Dolomite, pure, coarse grained; oolitic chert
					Gunter		0-15	Sandstone, dolomitic
CAMBRIAN	CROIXAN	TREMP			Eminence		50-150	Dolomite, sandy
					Potosi		90-220	Dolomite; drusy quartz in vugs
		FRAN			Franconia		50-200	Sandstone, glauconitic; dolomite; shale
					Ironton		80-130	Sandstone, partly dolomitic, medium grained
		DRESBACHIAN			Galesville		10-100	Sandstone, fine grained
			Potsdam		Eau Claire		370-570	Siltstone, dolomite, sandstone and shale, glauconitic
					Mt. Simon		1200-2900	Sandstone, fine to coarse; quartz pebbles in some beds
PRE-CAM.								Granite

FIGURE 2-4

GENERALIZED STRATIGRAPHIC COLUMN FOR THE CHICAGO AREA FROM WILLMAN, 1971

PROJECT: 0252 | REPORT: TM1 | DRAWN: MO | CHECKED: | DATED: 1/30/81 | APPROVED: | CLIENT NAME: LENZ OIL

ERM

PROJECT:	REPORT:	DRAWN:	CHECKED:	DATE:	APPROVED:	CLIENT NAME:
0252	TM1	GW		2\4\91		LENZ OIL

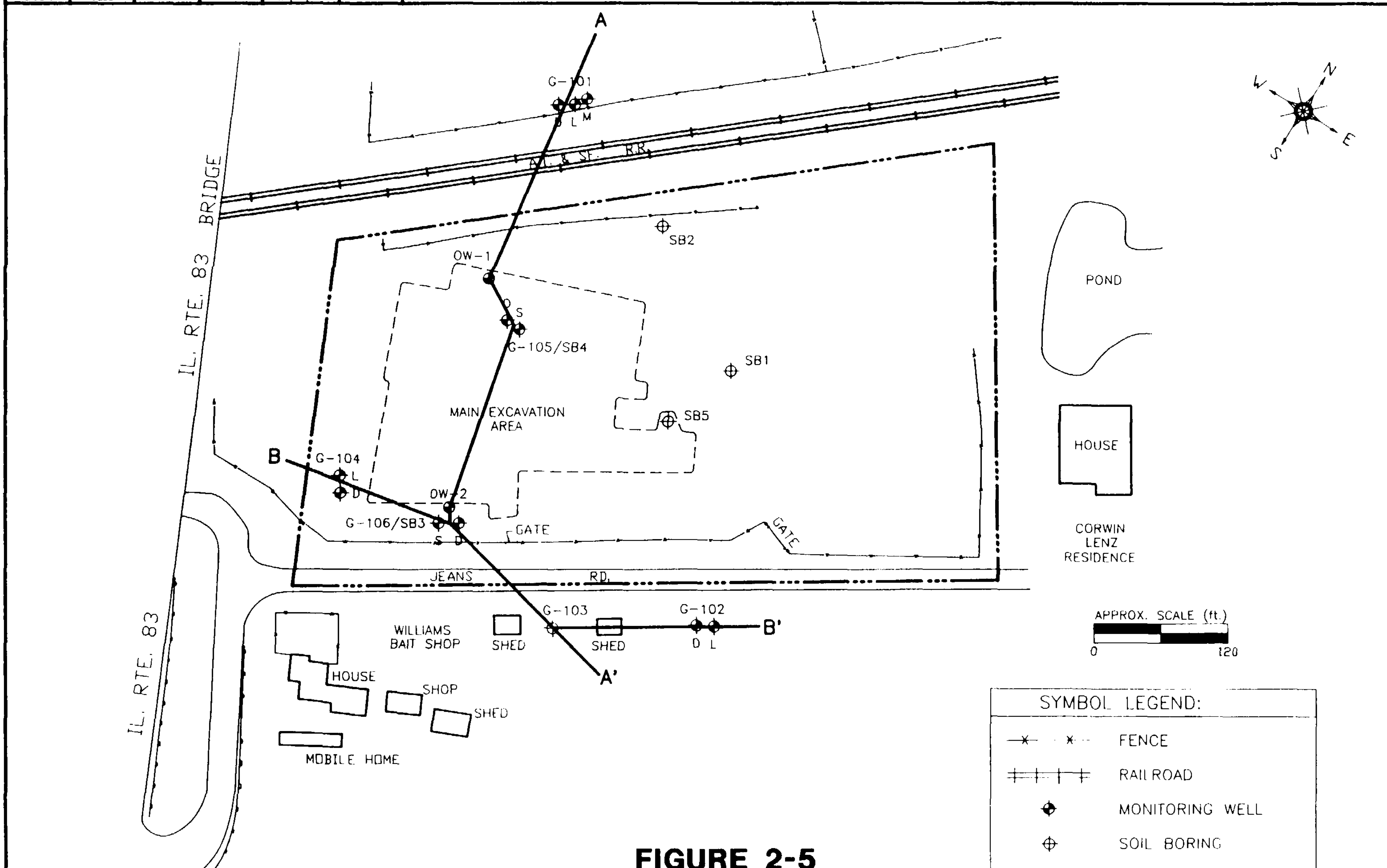


FIGURE 2-5

SOIL BORING/MONITORING WELL LOCATION MAP LENZ OIL

ERM

PROJECT:	REPORT:	DRAWN:	CHECKED:	DATE:	APPROVED:
0252	TM1	MO		2/4/91	

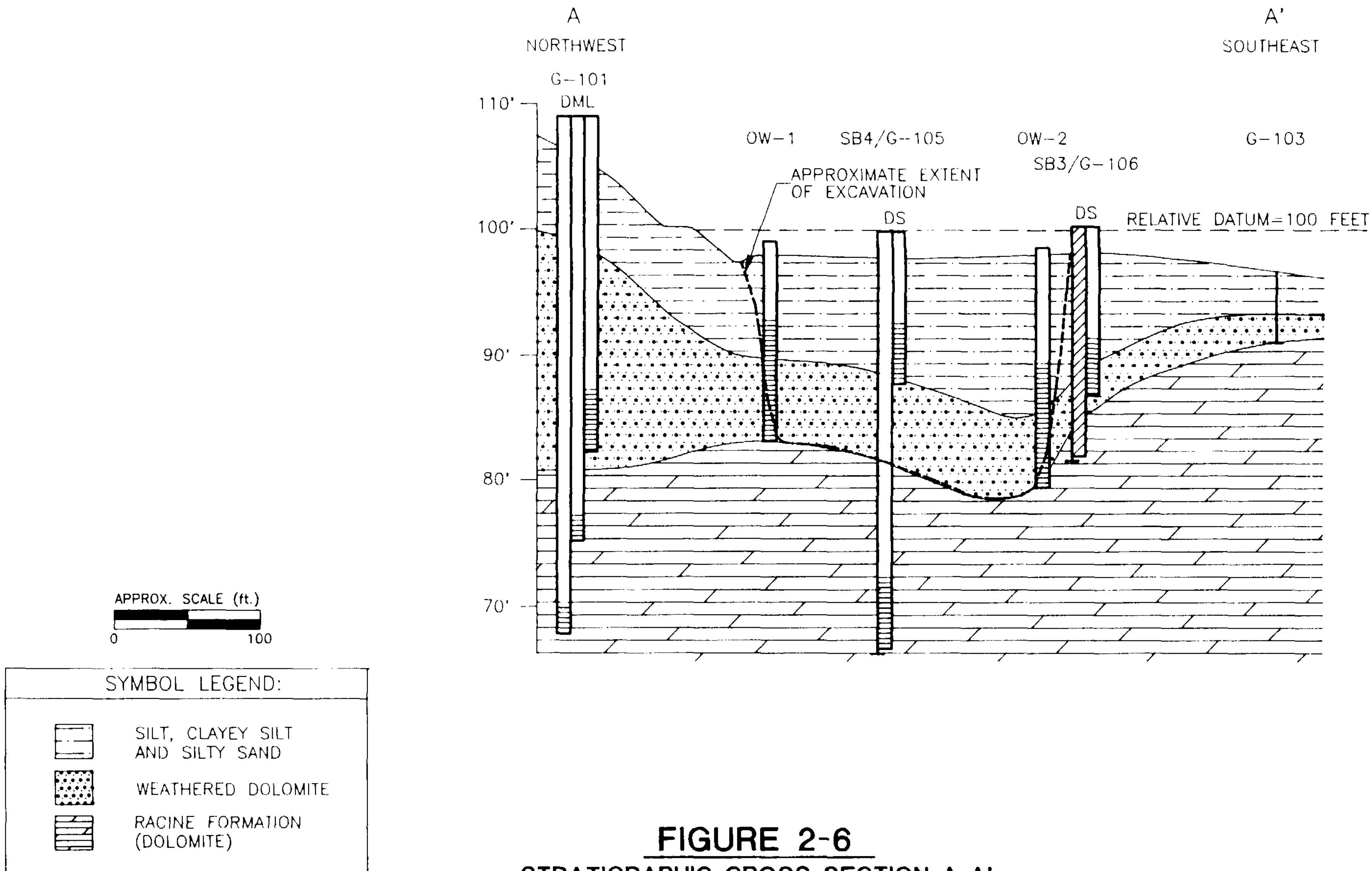
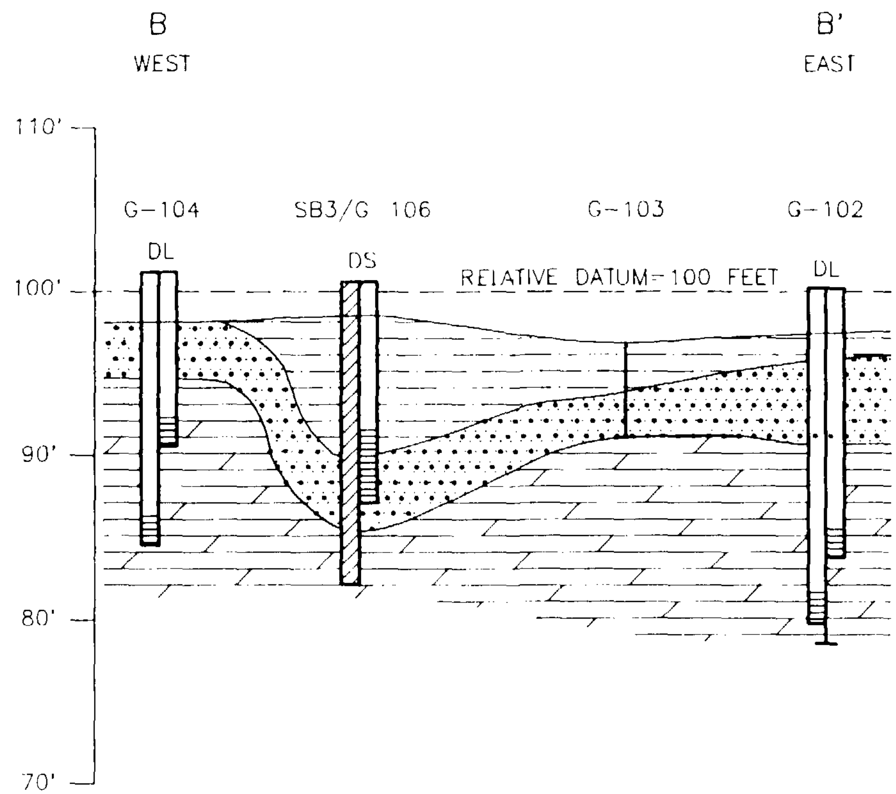


FIGURE 2-6

STRATIGRAPHIC CROSS SECTION A-A'
LENZ OIL SITE

PROJECT:	REPORT:	DRAWN:	CHECKED:	DATE:	APPROVED:
0252	TM1	MO		2/1/91	



APPROX. SCALE (ft.)
0 100

SYMBOL LEGEND:

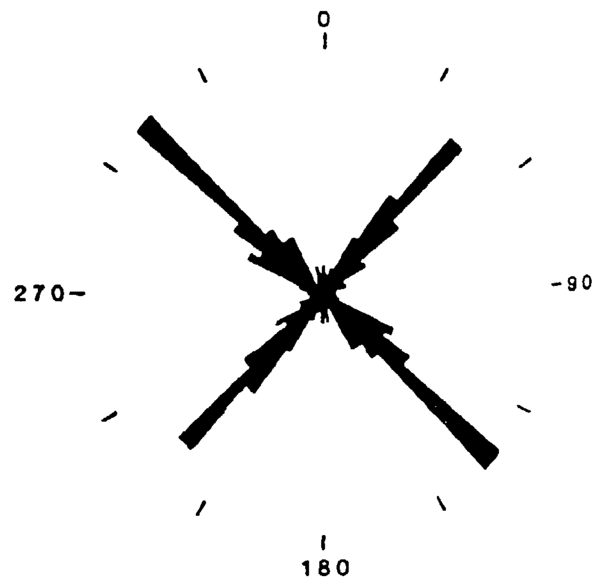
- SILT, CLAYEY SILT AND SILTY SAND
- WEATHERED DOLOMITE
- RACINE FORMATION (DOLOMITE)

FIGURE 2-7

STRATIGRAPHIC CROSS SECTION B-B'
LENZ OIL SITE

ERM

PROJECT:	REPORT:	DRAWN:	CHECKED:	DATE:	APPROVED:
0252	TM1	MO		4/29/91	

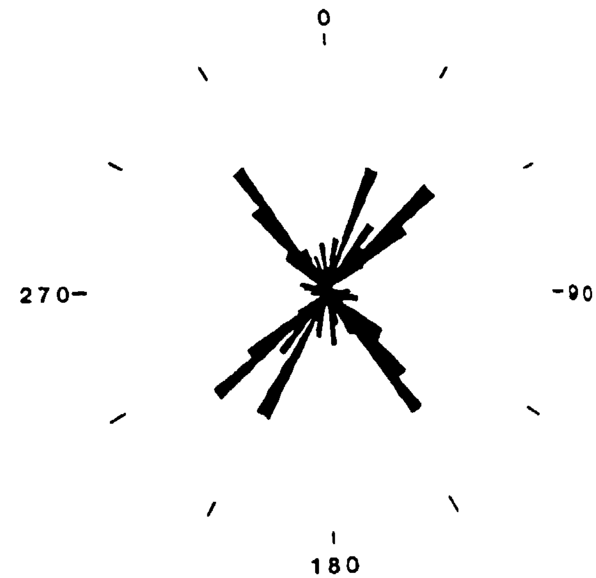


VERTICAL JOINTS

EQUAL-ANGLE NET. TOTAL JOINTS PER 5 DEGREE SECTOR. 1 JOINT EQUALS 1 UNIT LENGTH

0 10 UNITS

A



LINEAMENTS

EQUAL-ANGLE NET. TOTAL LINEAMENT LENGTH PER 5 DEGREE SECTOR. 1000 FEET EQUALS 1 UNIT LENGTH.

0 10 UNITS

B

NOTE: ORIENTATIONS ARE IN DEGREES AZIMUTH; ZERO DEGREES IS TRUE NORTH. MODIFIED FROM NICHOLAS AND HEALY (1988).

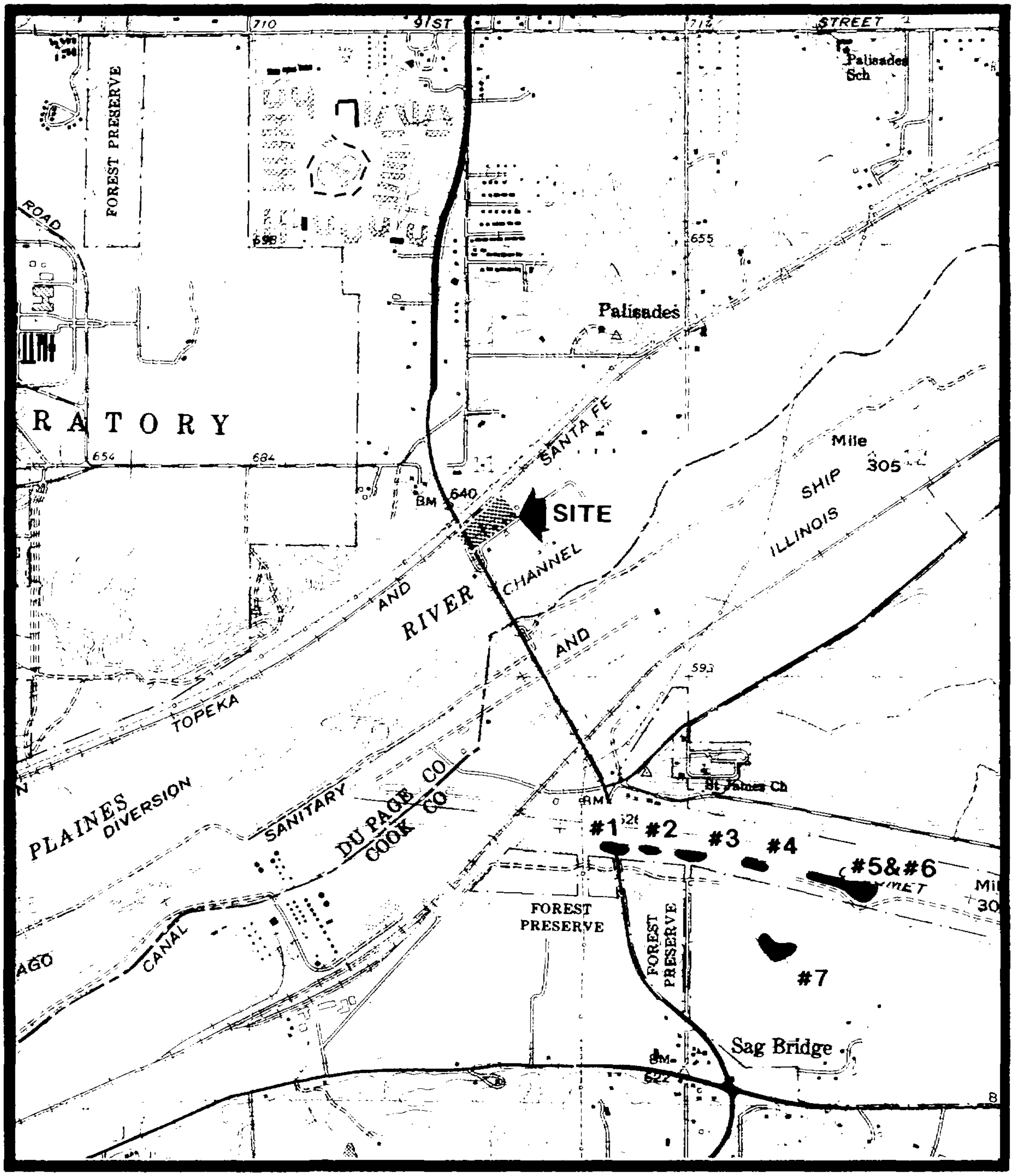
FIGURE 2-8

U.S.G.S.
VERTICAL JOINT AND LINEAMENT ORIENTATION DATA
LEMONT, ILLINOIS AREA

ERM

SAG BRIDGE QUADRANGLE
ILLINOIS
7.5 MINUTE SERIES (TOPOGRAPHIC)
1963
PHOTOREVISED 1973
PHOTOINSPECTED 1978

N
W E
S



SCALE 1:24000
1 .5 0 1 MILE

CONTOUR INTERVAL 5 FEET

FIGURE 2-9

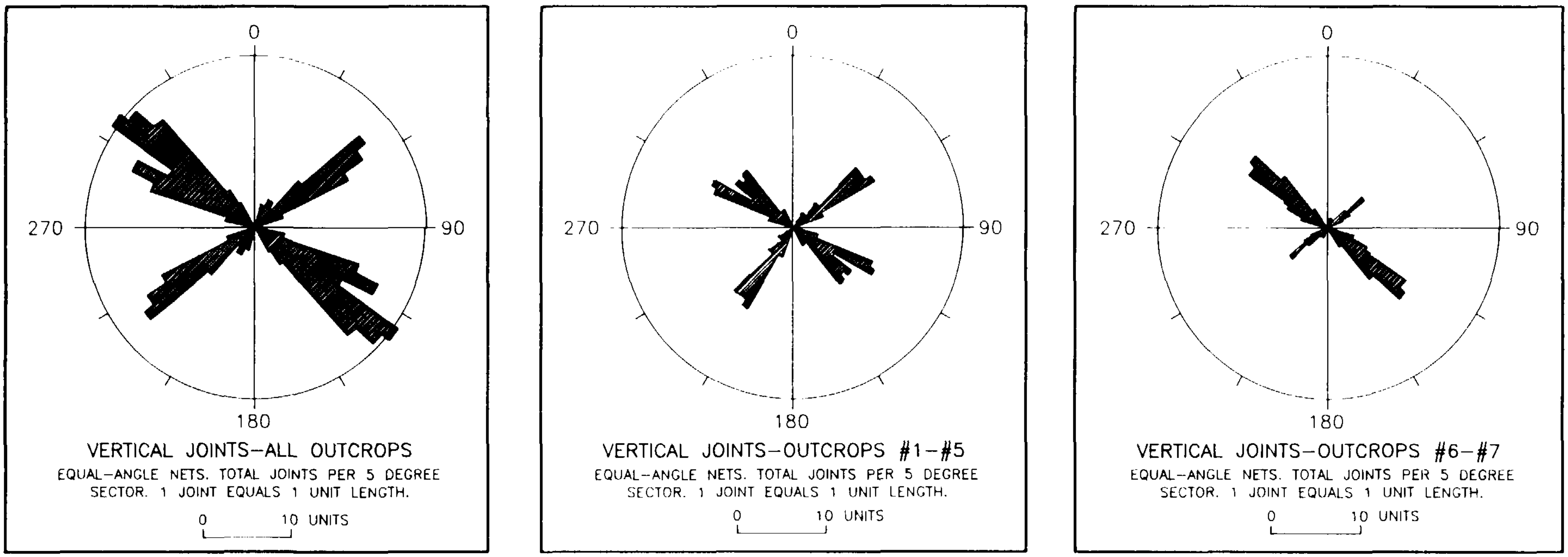
OUTCROP LOCATION MAP
LENZ OIL SITE

SYMBOL LEGEND:
OUTCROP USED FOR JOINT MEASUREMENTS

CLIENT NAME: LENZ OIL
APPROVED:
DATE: 5/1/91
CHECKED:
DRAWN: BLAS
REPORT: TM1
PROJECT: 0252

ERM

PROJECT:	REPORT:	DRAWN:	CHECKED:	DATE:	APPROVED:
0252	TM1	MO		4/30/91	



A B C

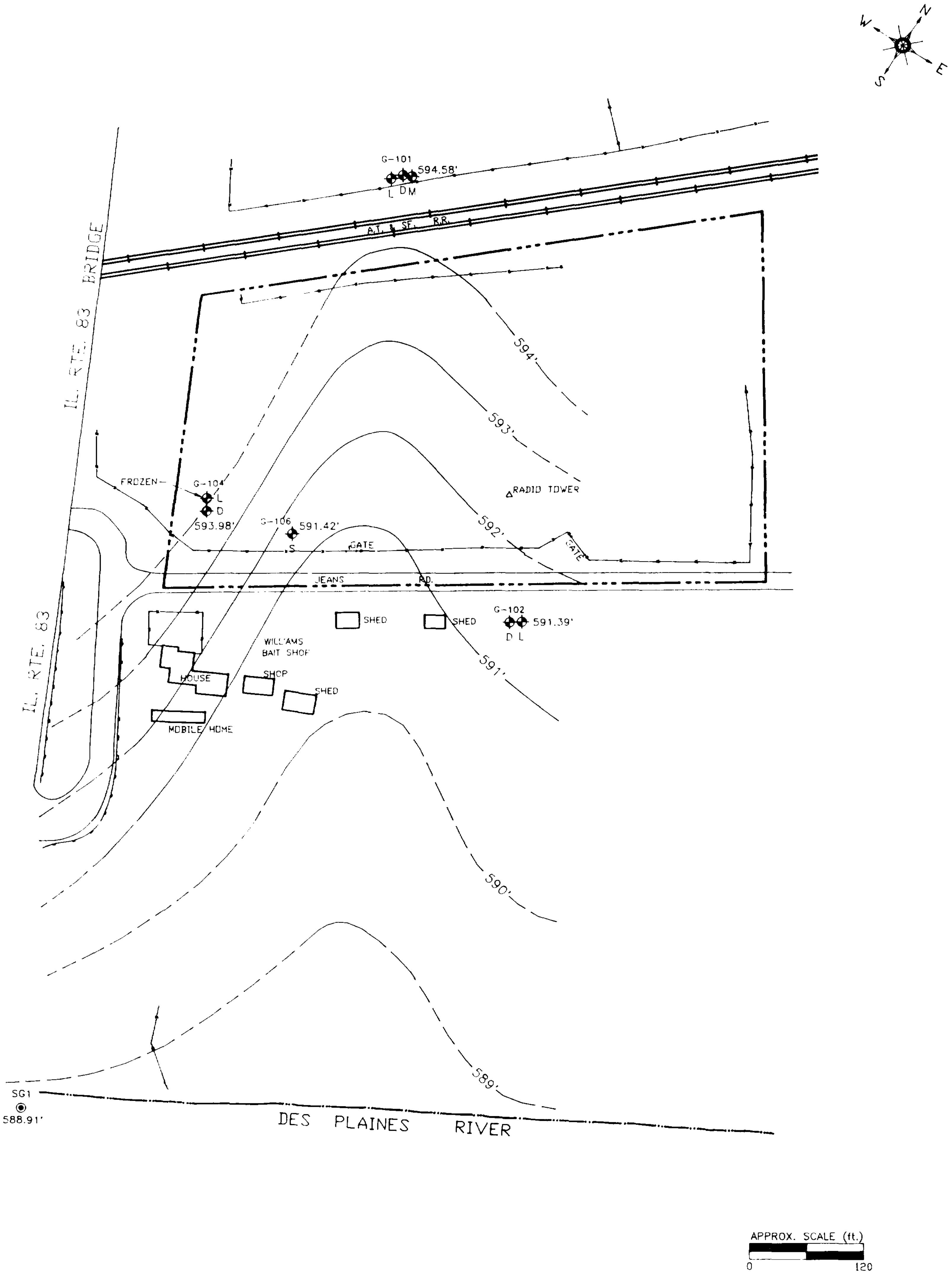
NOTE: ORIENTATIONS ARE IN DEGREES AZIMUTH.
ZERO DEGREES IS TRUE NORTH.

FIGURE 2-10

ERM VERTICAL JOINT ORIENTATION DATA LEMONT, ILLINOIS AREA

ERM

PROJECT:	REPORT:	DRAWN:	CHECKED:	DATE:	APPROVED:	CLIENT NAME:
0252	TM2	MO-		4/29/91		LENZ OIL



SYMBOL LEGEND:

—··—	PROPERTY LINE
-x- -x-	FENCE LINE
┼┼┼	RAILROAD
( )	WATER SURFACE
◆	EXISITING MONITORING WELL
⊙	SURFACE WATER GAGE

WELL DEPTH NOTATION:

D	DEEP WELL
G101L	INTERMEDIATE DEPTH WELL
M,L AND S	SHALLOW WELL

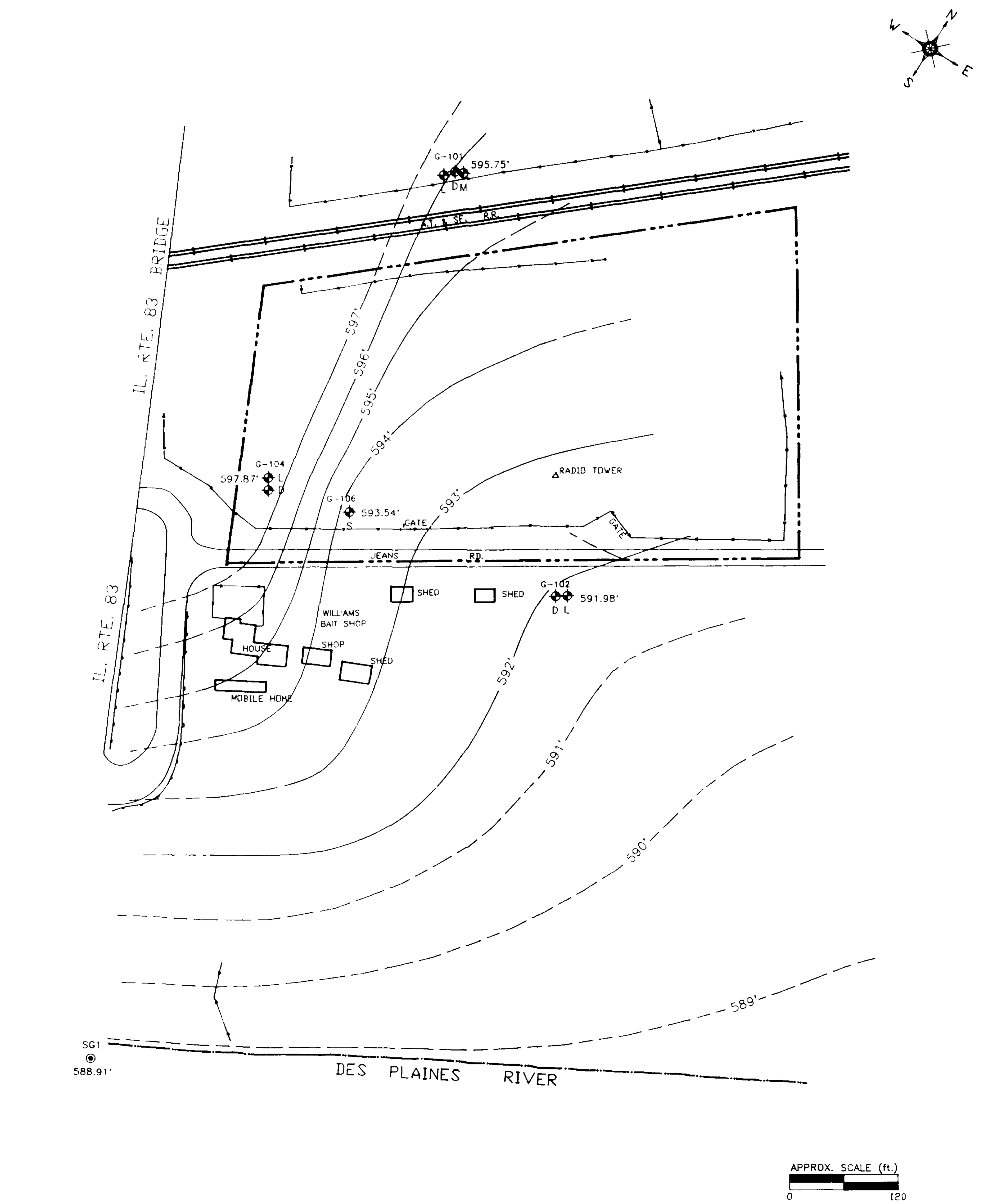
NOTE:
SOUNDING OF WELLS ON 1/29/91 INDICATED THAT WELLS G-101M, G-102L G-104L, G-104D AND G-106S ARE OF COMPARABLE DEPTH.

FIGURE 2-11

WATER TABLE MAP
SHALLOW WELLS
JANUARY 29, 1991
LENZ OIL SITE

ERM

PROJECT:	REPORT:	DRAWN:	CHECKED:	DATE:	APPROVED:	CLIENT NAME:
0252	TM1	MO-		4/29/91		LENZ OIL



SYMBOL LEGEND:

- PROPERTY LINE
- FENCE LINE
- RAILROAD
- WATER SURFACE
- EXISITING MONITORING WELL
- SURFACE WATER GAGE

WELL DEPTH NOTATION:

D	DEEP WELL
G101L	INTERMEDIATE DEPTH WELL
M,L AND S	SHALLOW WELL

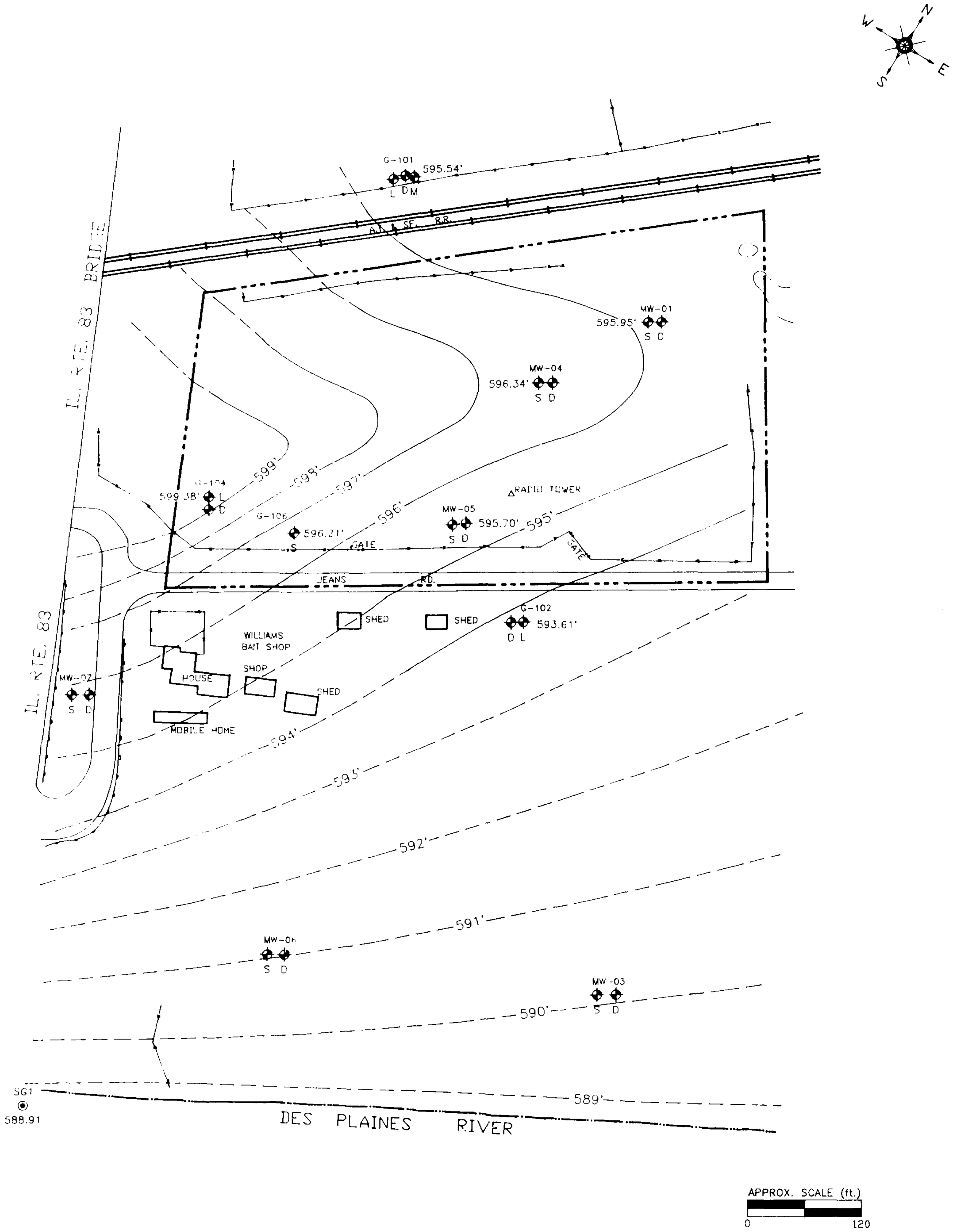
NOTE:
SOUNDING OF WELLS ON 1/29/91 INDICATED THAT WELLS G-101M, G-102L G-104L, G-104D AND G-106S ARE OF COMPARABLE DEPTH.

FIGURE 2-12

WATER TABLE MAP
SHALLOW WELLS
FEBRUARY 26, 1991
LENZ OIL SITE

ERM

PROJECT:	REPORT:	DRAWN:	CHECKED:	DATE:	APPROVED:	CLIENT NAME:
0252	TM1	MO-		4/29/91		LENZ OIL



SYMBOL LEGEND:

	PROPERTY LINE
	FENCE LINE
	RAILROAD
	WATER SURFACE
	EXISITING MONITORING WELL
	SURFACE WATER GAGE
WELL DEPTH NOTATION:	
D	DEEP WELL
G101L	INTERMEDIATE DEPTH WELL
M,L AND S	SHALLOW WELL

FIGURE 2-13

WATER TABLE MAP
SHALLOW WELLS
MARCH 20, 1991
LENZ OIL SITE

ERM

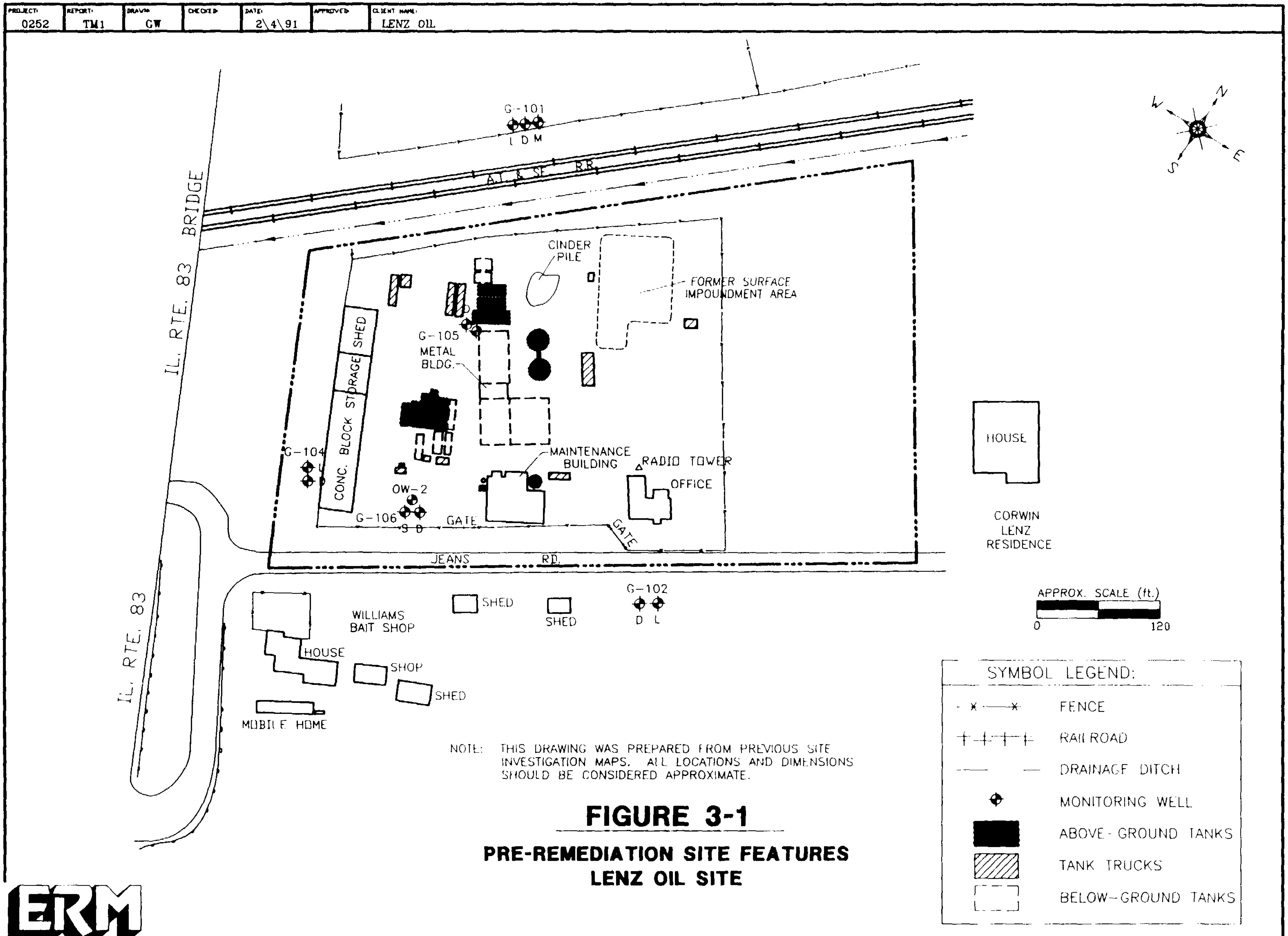


FIGURE 3-1

PRE-REMEDIATION SITE FEATURES
LENZ OIL SITE

APPENDIX A

GEOLOGIC LOGS

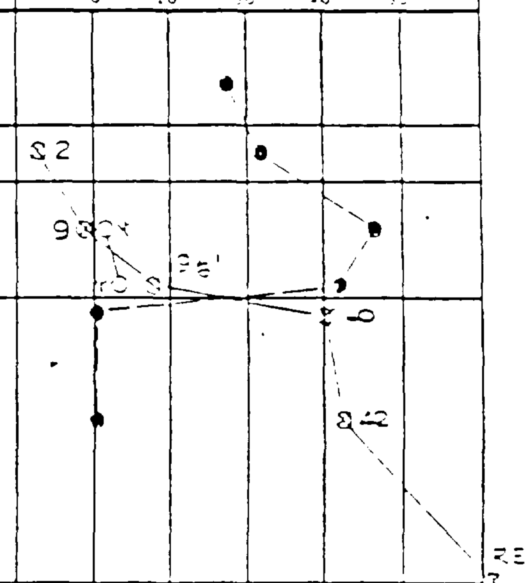
OWNER	LOG OF BORING NUMBER
Lenz Oil Service, Inc.	OW-1
PROJECT NAME	**ARCHITECT-ENGINEER**
Ground-Water Monitoring Well Installation	
SITE LOCATION	
Route #1, Lemont, Illinois	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT² 1 2 3 4 5

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % 10 20 30 40 50

STANDARD PENETRATION BLOWS/FT 10 20 30 40 50

ELEVATION	DEPTH	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 98.23)	UNIT DRY WT LBS/FT³
			PA			Crushed limestone, cinder fill & little clay lumps - lt. gray, dk. gray & sl. brown- moist (Fill) Strong chemical odor	
		1	ST				
		2	SS			Clayey topsoil and asphalt waste - dk. gray- very loose - wet (OH-Fill) Strong odor	
		3	SS				
		4				Organic clay, little silt, trace roots & cinders -dk. brown- stiff (OH-Fill) Possible topsoil - Strong chemical odor	
			PA				
		5	SS			Sandy fine to med. limestone gravel little clay & silt -brownish gray to dk. gray- dense - saturated (GC) Strong chemical odor, becoming moderate with depth Refusal to power auger at 15.0 ft	
			PA				
			SS				



END OF BORING

*CALIBRATED PENETROMETER

Installed 2" monitoring well at 15'

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN SITU, THE TRANSITION MAY BE GRADUAL

WL	WS or WD	BORING STARTED 1/7/91
WL BCR	ACR	BORING COMPLETED 1/7/91
WL 12.0' after 1 hrs.		RIG Auger FOREMAN Denis

SOIL TESTING SERVICES INC
111 PFINGSTEN ROAD
NORTHBROOK ILLINOIS 60062

APP'D BY | STS JOB NO

OWNER	LOG OF BORING NUMBER
Lenz Oil Service, Inc.	OW-2
PROJECT NAME	ARCHITECT-ENGINEER
Ground-Water Monitoring Well Installation	
SITE LOCATION	
Route #1, Lemont, Illinois	

SURFACE ELEVATION 99.59

SAMPLE NO	SAMPLE TYPE	DESCRIPTION OF MATERIAL
	PA	Crushed stone (Fill)
1	SS	"A"
	PA	Sandy silt, trace clay & gravel - lt. brown- dense - saturated (ML) Strong chemical odor
2	SS	
2A		
	PA	Clayey silt, little sand, trace gravel - lt. brown & lt. gray- very dense - moist (ML-CL) moderate chemical odor
3	SS	
	PA	
4	SS	Sandy silt, trace clay & gravel - gray- very dense to extremely dense - moist (ML) Moderate chemical odor - highly cemented at 10 ft
	PA	
5	SS	
	PA	
	PA	Sandy fine to med. limestone gravel little clay & silt - lt. gray- dense - saturated (GC) Strong chemical odor
6	SS	
	PA	Refusal to power auger at 19.3 ft

END OF BORING

"A" - Silty fine to coarse sand, little gravel, trace clay - light brown- dense - moist (SM) Strong chemical odor

Installed 2" monitoring well at 19.3'

WL	BORING STARTED	SOIL TESTING SERVICES, INC 111 PFINGSTEN ROAD NORTHBROOK ILLINOIS 60062
WL BCR ACR	BORING COMPLETED 1/7/91	
WL	RIG Auger FOREMAN Denis	APP'D BY MGS · STS JOB NO

Illinois Environmental Protection Agency

BORING NO	WELL NO	GROUNDLEVEL ELEV	PAGE
101	101-D		1 / 3

COUNTY: Dupage

SITE NO:

SITE: Lenz Oil

BORING LOCATION: See Map

DRILLING EQUIPMENT: CME 73 SIZE: 3 1/4" Hollow Stem Augers TYPE:

COMPLETION DEPTH: 38.00 BEDROCK DEPTH: 25.3 TOP OF CASING: +3.00

DATE START: 4/29/86 FINISH: 4/29/86

TIME START: 900a FINISH: 400pm

ANNULUS FILL MATERIAL ABOVE PACKING: See well construction diagram

PACKING:

SCREEN:

WELL CASING TYPE AND QUANTITY: 316 Stainless Steel. See well construction diagram.

SCREEN INTERVAL TYPE AND QUANTITY: See well construction Diagram

PERSONNEL: Grede, Boise, Murphy, Aldelikian

ELEV	DESCRIPTION	DEPTH	Sample No	Sampler Type	Sample Recovery Ft	Penetrometer (Strength)	N Value (Blows)	REMARKS
	0-0.6 Dark brown Silt, grass roots. 0.6-1.9 Brown Clayey sandy silt with small gravel pebbles, some cobble size dolomite pieces.	0 – 1		SS	0.7		~ 3 6	
	1.9-6.6 Brown silt with some pebbles and gravel. Iron staining, blocky texture. Few spots of gray (unweathered) material	1 – 2		SS	0.4		~ 3 6	
		3 – 4		SS	1.1		~ 7 8	
		4 – 5		SS	1.1		~ 7 8	
	6.6-9.2 Silty sand with pebbles and gravel Light tan. Moist. Dolomite majority of gravel pieces, some sandstone also in pebble size pieces	6 – 7		SS	1.2		~ 7 8	
		7 – 8		SS	0.1		~ 15 23	
	9.2-11.8 Silty gravel slight amount of sand light tan to light brown. Blocky texture.	9 – 10		SS	1.4		~ 30 41	
		10 – 11		SS	1.5		~ 37 47	
	11.8-12.9 Silty dolomitic gravel-gray. slight clay, and $CaCO_3$ uncrackled blocky texture, well consolidated. 12.9-17.6 Brown silty sand with pebbles and gravel, Light brown. Slight $CaCO_3$ cement. Fine to coarse Sand.	12 – 13		SS	1.2		~ 50 47	
		13 – 14					~	

Illinois Environmental Protection Agency

BORING NO 101	WELL NO 101-D	GROUNDLEVEL ELEV	PAGE 2 OF 3
COUNTY Dupage	SITE NO		
SITE Lenz O.1		DATE START 4/29/86 FINISH 4/29/86	ANNULUS FILL MATERIAL ABOVE PACKING
BORING LOCATION See Map			PACKING
DRILLING EQUIPMENT CME 75 3 3/4" Hollow Stem Auger	SIZE	TIME START 9a FINISH 4p	
COMPLETION DEPTH 38.00	BEDROCK DEPTH 25.3	TOP OF CASING +3.00	SCREEN
WELL CASING See well construction diagram	TYPE AND QUANTITY		PERSONNEL L: Greile; D: Boise; H: Murphy, [illegible]
SCREEN INTERVAL	TYPE AND QUANTITY		

ELEV	DESCRIPTION	DEPTH	Sample No	Sampler Type	Sample Recovery (ft)	Penetrometer (Strength)	N Value (Blows)	REMARKS
		14		SS	1.0		44-29	wet
		15		SS	1.0		–15-13	
		16						
	17.6-21.1 Dolomite cobbles and boulders in silty gravel. Gray to off white in fresh fractures. Some sand at 19.8 to 20.1 ft.	17		SS	1.1		–10-9	
		18		SS	0.7		–14-8	
		19						
		20		SS	1.2		–13-15	
	21.7-21.9 Brown silty gravel with some sand	21		SS	1.3		–18-28	
	21.9-25.3 Brown fractured dolomite cobbles boulders and gravel. Sand zone 22.5 to 22.8. Silty clay at 23.4 to 23.6	22						
		23		SS	1.1		–22-31	
		24		CS	1.3			
	25.3-35.0 Dolomite - slightly fractured light gray to off white. Clay filling horizontal fractures. Competent, consolidated rock.	25						Bedrock surf at 25.3 feet
		26						
		27						
		28						

Illinois Environmental Protection Agency

BORING NO	WELL NO	GROUNDLEVEL ELEV	PAGE
101			3 3

COUNTY: Dupage
SITE NO:
SITE: Long Oil
BORING LOCATION: See map
DRILLING EQUIPMENT: See first page
SIZE:
TYPE:
COMPLETION DEPTH:
BEDROCK DEPTH:
TOP OF CASING:

DATE — START: 4/29/86 FINISH: 4/29
TIME — START: 9a FINISH: 4p

ANNULUS FILL MATERIAL
ABOVE PACKING:
PACKING:
SCREEN:

WELL CASING — TYPE AND QUANTITY:
SCREEN INTERVAL — TYPE AND QUANTITY:

PERSONNEL
- Grade
- Boise
- Murphy

ELEV	DESCRIPTION	DEPTH	Sample No	Sampler Type	Sample Recovery Ft	Penetrometer (Strength)	N Value (Blows)	REMARKS
	See previous page for bedrock description	28						
		29						
		30						
		31						
		32						
		33						
		34						
		35						
		36						
		37						
		38						EOB

Illinois Environmental Protection Agency

BORING NO	WELL NO	GROUNDLEVEL ELEV	PAGE OF
102			1 2

COUNTY	Dupage
SITE NO	
SITE	Lemont - Lenz Oil
BORING LOCATION	~25' E of SE corner of Lenz Property, across road
DRILLING EQUIPMENT	CME 75
SIZE	3 1/4 H.S.A
TYPE	
COMPLETION DEPTH	19.2
BEDROCK DEPTH	6.7
TOP OF CASING	—
DATE START	4/15/86
DATE FINISH	4/15/86
TIME START	1000a
TIME FINISH	400p
ANNULUS FILL MATERIAL — ABOVE PACKING	
PACKING	
SCREEN	
WELL CASING	—
TYPE AND QUANTITY	—
SCREEN INTERVAL	—
TYPE AND QUANTITY	—

PERSONNEL
L: Greule
D: Boone
H: Murphy, Adelphson

DEPTH	DESCRIPTION	Sample No	Sampler Type	Sample Recovery Ft	Penetrometer (Strength)	N Value (Blows)	REMARKS
0	0-0.55 Dark brown silt, grass, roots, little clay						
	0.55-0.75 Sandy silt with gravel - brown						
1	0.75-6.1 Silty gravel (dolomite and sandstone) with varying concentrations of sand, gravel and silt. Dry. $CaCO_3$ present. Cobbles and boulders of dolomite (2.4 to 2.6, 5.0 to 5.9). Light tan to light brown. Iron stains present from 2.6 to 3.9		SS	1.1		3 19 37	
3			SS	1.9			
5			SS	1.9		36 53 35	
6	6.1-6.7 Grey gravelly clayey silt, dolomite gravel, small amounts of sand						
7	6.7-19.2 Dolomite - Light gray, secondary porosity from fractures and solutioning. Silt nodules prominent from 17.1 to 19.2. Vertical (high angle) and horizontal fractures		SS	1.0			
8				NR			augered to 9.3 to set augers for coring.
10-14			CORE BARREL	9.9			

Illinois Environmental Protection Agency

BORING NO	WELL NO	GROUNDLEVEL ELEV	PAGE OF
102			2 of 2

COUNTY: Dupage	SITE NO	DATE — START: 4/15/86 FINISH: 4/15
SITE: Lenicnt Lane Oil		ANNULUS FILL MATERIAL — ABOVE PACKING:
BORING LOCATION: ~25' E of SE corner of Lane Property across road		TIME — START: 1000 FINISH: 400p
DRILLING EQUIPMENT: Cipe 75	SIZE: 3¼" HSA 3¼ core barrel	TYPE: Christensen
COMPLETION DEPTH: 19.2	BEDROCK DEPTH: 6.7	TOP OF CASING: –
PACKING		
SCREEN		

WELL CASING — TYPE AND QUANTITY: –

SCREEN INTERVAL — TYPE AND QUANTITY: –

PERSONNEL: Grele; D. B...; Mulinky, Akkelsen

ELEV	DESCRIPTION	DEPTH	Sample No	Sampler Type	Sample Recovery Ft	Penetrometer (Strength)	N Value (Blows)	REMARKS
	See previous page for description	14						
		15						
		16						
		17						
		18						
		19						EOB 19.2'
		20						

Illinois Environmental Protection Agency

BORING NO	WELL NO	GROUNDLEVEL ELEV	PAGE OF
103			1 / 1

COUNTY	SITE NO	DATE START	DATE FINISH	ANNULUS FILL MATERIAL ABOVE PACKING
Dupage		4/16/86	4/16/86	—

SITE: Lemont Lenz Oil

BORING LOCATION: Williams Bait Shop

DRILLING EQUIPMENT: CME 75 — SIZE: 3 3/4" H.S.A — TYPE: 24" Split Spoon Sampler

TIME START: 920a — TIME FINISH: 1100a

PACKING: —

COMPLETION DEPTH: 5.7 — BEDROCK DEPTH: 5.6 — TOP OF CASING: —

SCREEN: —

WELL CASING: — TYPE AND QUANTITY: —

SCREEN INTERVAL: — TYPE AND QUANTITY: —

PERSONNEL: L. Grede; D. Bosie; H. Murphy, Ihlelalisa

ELEV	DESCRIPTION	DEPTH	Sample No	Sampler Type	Sample Recovery Ft	Penetrometer (Strength)	N Value (Blows)	REMARKS
	0-0.4 Dark brown silt, with organics, roots. Moist.	0						
	0.4-1.0 Light brown sandy silt medium grained sand, some pebbles. Moist Few gravel pieces. Roots	1		SS	0.9		1 / 3 / 3	
	2.0-3.0 Light tan silty sand Small pebbles and some gravel, dry. Fine to medium gr sand Light brown 2.6 to 3.0, same composition.	2		SS	1.6		19 / 40 / 84	
	3.0-5.6 Light brown sandy silt, $CaCO_3$ abundant dolomite pebbles and gravel. Faint chemical odor at 4.4 dry Hard. Dolomite boulder at 4.0 to 4.3	3, 4						
		5		SS	1.7		48 / 95 / 100	
	5.6-5.7 Light gray dolomite, fine grained, no fractures apparent Split spoon refusal at 5.7.	6						EOB 5.7

IL 532-1112
LPC 137 6/83

Illinois Environmental Protection Agency

BORING NO	WELL NO	GROUNDLEVEL ELEV	PAGE
104			1 / 1

COUNTY	SITE NO	DATE START	DATE FINISH	ANNULUS FILL MATERIAL ABOVE PACKING
Dupage		5/13/86	5/13/86	

SITE		TIME START	TIME FINISH	PACKING
Lemont - Lenz Oil		900a	1030a	

BORING LOCATION: See map

DRILLING EQUIPMENT: CME 75 — SIZE: 6 1/4" — TYPE: Hollow Stem Augers

COMPLETION DEPTH: 3.9 — BEDROCK DEPTH: 3.4 — TOP OF CASING: — SCREEN:

WELL CASING: — — TYPE AND QUANTITY: —

SCREEN INTERVAL: — — TYPE AND QUANTITY: —

PERSONNEL: Grede, Adolphsen, Murphy

ELEV	DESCRIPTION	DEPTH	Sample No	Sampler Type	Sample Recovery Ft	Penetrometer (Strength)	N Value (Blows)	REMARKS
	0-0.4 Dark brown silt with gravel, very oily smell.	0						
	0.4-1.6 - dolomite cobble in med to fine grained sand, tan.			SS	0.6		7, 7	
		1						
	1.6-3.4 Clayey silt with gravel and cobbles. very light brown. 1.6-1.9 layer of pea gravel with silt.	2		SS	1.0		14, 28	
	3.4 Dolomite - light gray where fresh, buff where not. dry.	3		SS	0.4		100	EOB.
		4						

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Field Borehole Log

CLIENT IEPA
PROJECT LENZ OIL, LEMONT ILLINOIS
SITE
LOCATION (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR CANONIE DRILLING
METHOD OF BORING: SOIL 6.25 INCH I.D HOLLOW STEM
ROCK NX ... REAM TO 3 7/8"

JOB NO. 06369 HOLE NO. SB4 (105) SHEET NO. 1 OF 2
WEATHER HOT, HUMID INSPECTOR A. BLACKMAN
TEMP ~90 °F STARTED 6:00 A.M 7/19 19 8_
DIP ° FINISHED 3:00 A.M 7/21 19 8_
CASING DIAM. 6 I.D.
CORE DIAM. NX
ELEVATIONS: DATUM
DRILL PLATFORM
GROUND SURFACE
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE, B - THIN WALL TUBE, C - PISTON SAMPLER, D - CORE BARREL, E - AUGER, F - WASH, K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT, O - TUBE, P - WATER CONTENT TIN, Q - GLASS JAR, R - CLOTH BAG, S - PLIOFILM BAG, Y - CORE BOX, Z - DISCARDED

LOG	DESCRIPTION: COLOR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOR; ETC.	ELEV. — DEPTH	*	** TYPE	NO	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING; TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT; ETC.
	0-6" | SM | BROWN SILTY SAND 6-8" | SM | B... SILTY SAND 8-10" PEA GRAVEL WITH SILT	1.0	X	AQ	401	24	10	36 FOR 1.5 FT	 WHITE
	0-" | ML | BROWN-GRAY SILT ... PEBBLES DRY ... STIFF	2.0 3.0	X	AQ	402		10	34	OVA SPOON = 0 PPM, OVA ...>1000 NO OBVIOUS OIL STAINING PICTURE (P) #18
	0-" | ML | SAME AS ABOVE	4.0	X	AQ	403		4	PUSHED	 P=19
	0-" | ML | DARK BROWN SILT GRAY, MOIST, STIFF WOOD FRAG... (FILL?)	5.0 6.0	X	AQ	404		11	PUSHED PUSHED 22	OVA ...>1000 PPM, OVA B.Z. = ... 40 PPM, OVA JAR SAMPLE>1000 P=20
	0-6" | ML | GRAY CLAY SILT NO PEBBLES PIECE OF WOOD AT BOTTOM OF SPOON, STIFF	7.0	X	AQ	405		6	31	OVA HOLE >1000, OVA JAR = 600 NO OBVIOUS OIL STAINING P=21
	0-2" ML POORLY SORTED ... CLAY WITH PEBBLES	8.0 9.0	X	AQ	406		2	30	OVA HOLE >1000 OVA JAR >1000 BLACK LIQUID ... OF WATER
	0-3" | ML | SPIRALS BROWN SILTY CLAY TOPSOIL ? 3-8" ... PEBBLES WITH PIECE OF WOOD	10	X	AQ	407		8	48	OVA HOLE >1000, OVA SPOON = 40 B.Z. = 30 PPM. LIQUID IN SEPARATE... INTO MED BROWN LIQUID AND BLACK LIQUID ... IN COMPOSITE SAMPLE
	... | ML | GRAY SILTY CLAY WITH PEBBLES	11 12	X	AQ	408		4	60	OVA HOLE >1000, OVA JAR >1000 P=... LIQUID MED. BROWN TO BLACK
	0-4" | ML | GRAY SILTY CLAY 4-10" DOLOMITE ROCK FRAGMENT BEDROCK (?)	13	X	AQ	409		10	57	P=... OVA HOLE >1000, OVA ... = 100 PPM NO OBVIOUS STAINING ON ROCK FRAG...

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Field Borehole Log

JOB NO. [illegible] HOLE NO. [illegible] SHEET NO. 2 OF 3

Description	Depth	Sample Type	Sample No.	Recovery	PID	Remarks
[illegible] ROCK FRAGMENTS		AQ	4-10	3	82	OVA HOLE = 700 OVA [illegible] = 30 [illegible]; NO OBVIOUS STAINING [illegible]
[illegible] ROCK FRAGMENT [illegible]	16	AQ	4-11	2	112	OVA HOLE 2000 [illegible]; [illegible]
						OVA JAR = 340
[illegible]:		SET CASING				
FIRST RUN 5.4' (17.5-22.9') 80% RECOVERY	17.5					OVA HOLE 2000 PPM; OVA BREATHING ZONE = [illegible] PPM
GRAY SILTSTONE WITH ARGILLACEOUS PARTINGS						PEAKING TO [illegible] PPM; NO OBVIOUS OIL STAINING
HIGHLY FRACTURED [illegible] SOLID PIECE	20	DY		80% RECOVERY		ROCK [illegible] STAINED; RUSTY ORANGE [illegible]
6" FRAGMENTS RANGE [illegible] FROM FINE	21					LEFT IN CORE [illegible] OVERNIGHT (?)
GRAVEL TO 2" LONG						100% WATER LOSS
17.5-22.9 SURFACE OF CORE AND FRAGMENTS	22					
[illegible]	23					
[illegible] PER FOOT BLACK [illegible]	24					
[illegible] ROCK FRAGMENTS	25	DY		≈80% RECOVERY		
SECOND RUN 5.7' (22.9-28.6) ≈90% RECOVERY	26					OVA HOLE = 200 PPM; NO OBVIOUS OIL STAINING
22.9-23.4 SAME AS ABOVE; 23.4-26.2 4" PIECES	27					100% WATER LOSS; BREATHING ZONE = 1 PPM
3 EVENLY SPACED HORIZONTAL FRACTURES STAINED	28					ROUGH WITH BLACK MINERALIZATION [illegible]
BLACK; 26.2-27.0 HIGHLY FRACTURED	29			≈90%		BLACK HORIZONTAL FRACTURES WITH WHITE R NODULE[illegible]
PIECES RANGE FROM 0.5-3.0'; ~0.3 INCH DIAM BLACK NODULE	30	DY		RECOVERY		≈0.3 INCH DIAM.
IN ROCK. 27.0-28.6 SOLID CORE BROKEN IN 4 PLACES	31					
ALONG STEEPLY INCLINED FRACTURES. FRACTURES SMOOTH AND	32	END OF HOLE				
PLANER, NO STAINING OTHER FRACTURES						

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Field Borehole Log

JOB NO. 06369 HOLE NO. SB4 SHEET NO 3 OF 3

[illegible] 29 (25.6-31.5) [illegible]		END OF HOLE	OVA HOLE = 70 PPM TOP OF BARREL >1000 PPM
[illegible]			NO [illegible]
[illegible]			
[illegible]			
F.[illegible] NOT [illegible] [illegible]			

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Field Borehole Log

CLIENT [illegible] EPA
PROJECT [illegible]
SITE
LOCATION (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR [illegible]
METHOD OF BORING: SOIL [illegible] Stem Auger
ROCK [illegible] over drill

JOB NO. 0629 HOLE NO. SB3/LI06 SHEET NO. 1 OF 1
WEATHER HOT, HUMID INSPECTOR A. BLACKMAN
TEMP. ~90 °F STARTED 11:00 A.M. 7/16 19
DIP ° FINISHED 9:30 A.M. 7/18 19
ELEVATIONS: DATUM
CASING DIAM. DRILL PLATFORM
GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE, B - THIN WALL TUBE, C - PISTON SAMPLER, D - CORE BARREL, E - AUGER, F - WASH, K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT, O - TUBE, P - WATER CONTENT TIN, Q - GLASS JAR, R - CLOTH BAG, S - PLIOFILM BAG, Y - CORE BOX, Z - DISCARDED

LOG	DESCRIPTION: COLOR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOR; ETC.	ELEV. / DEPTH	*	** TYPE	NO	SIZE (IN.)	RET'D. (IN.)	BLOWS PER 6 INCH	NOTES: BORING; TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT; ETC.
	0-11" GP poorly sorted fine sand to fine gravel, fragments are subangular; bottom 2" moist	2		AQ	SB31	24	11	10, 9, 9, 6	OVA hole >1000 PPM, OVA jar 400 PPM. No picture, dropped camera
	0-3" GP same as above saturated; 3-7" ML dark brown clay silt, stiff, moist; 7-12" sandy dolomite rock fragments	3, 4		AQ	SB32		12	28, 14, 14, 6	OVA hole >1000 PPM, breathing zone 1 PPM, sample jar = 160 PPM
	0-19" ML gray to yellow-brown [illegible] silt with some clay, sub-angular small to med pebbles, 19" rock fragments	5, 6		AQ	3		19	13, 19, 43, 26	OVA hole >1000, B.Z. = 1 PPM. Fluid in spoon, silt is moist, no obvious staining
	0-3" ML yellow-brown silt with rock fragments; 3-15" ML gray silt with rock fragments, subrounded	7, 8		AQ	4		15	16, 38, 29, 35	OVA B.Z. = 1 PPM; OVA jar = 46[illegible]. Pebbles, sharp contact between yellow-brown and gray silts; no visible staining. Damp
	0-14" ML gray silt with large weathered, highly fractured cobble, obvious oil staining, moist	9, 10		AQ	5		14	24, 20, 27, 31	Black oily liquid mixed [illegible] water drained from spoon. OVA hole >1000, BZ = 5-8 PPM. OVA jar >1000
	0-3" ML gray silt with rock fragments; 3-9" dark gray rock fragments; 9-17" dolomite rock fragments	11, 12		AQ	6		17	46, 18, 25, 33	OVA hole >1000 PPM; OVA jar = 24[illegible]. Some silt; moist, no obvious staining; oily phase apparent in augered cuttings
	0-4" rock fragments with some silt, sample moist. REFUSAL ⇒ BEDROCK(?)	13		AQ	7		4"	46, 100 for 3 inch	OVA jar = 120 PPM, B.Z. = 8 PPM

Margin notes: TILL? (at ~4 ft), TILL? (at ~7 ft), BEDROCK (?) (at ~13 ft)

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Field Borehole Log

JOB NO. 05269 HOLE NO. SB3/ 100 SHEET NO. 2 OF 2

Description	Depth (ft)	Log		Recovery	Remarks
[illegible] ... 61 FEET					
FIRST RUN 5.3' (6.1' TO 11.4')	6				DRILLING RATE ... UNKNOWN ... BROKEN
6.1' TO 8.1' COMPETENT LIMESTONE (?), FINE ... VERTICAL JOINT WITH IRON STAINING AND HORIZONTAL BREAKS, FRACTURED, DARK GRAY; WEATHERED	7		DY	100% RECOVERY	
8.1' TO 11.4' NO RECOVERY EXCEPT FOR A FEW LARGE PEBBLES. PEBBLES ARE ROUNDED BUT SOURCE OF ROUNDING NOT KNOWN. COULD BE DUE TO TRANSPORT OR CORING PROCESS	8, 9, 10, 11	LOST	DY	1-2% RECOVERY	DURING CORING RATE INCREASED DRAMATICALLY ... DY WATER
ROCK HIT AGAIN AT 11.8'	12				BLACK STAINING ON MANY FRACTURE SURFACES. ONE
SECOND RUN 4.7' (11.8' TO 16.5')	13			≈60% RECOVERY	OBVIOUS SUBVERTICAL FRACTURE AT ~15' ... STAINED BLACK
11.8'-16.5' HIGHLY FRACTURED; PIECES RANGE IN LENGTH FROM APPROX. 4" TO FINE GRAVEL SIZE FRAGMENTS. MATERIAL APPEARS TO BE ARGILLACEOUS LIMESTONE, DOLOMITE (?), LIGHT GRAY	14, 15, 16		DY		BLACK MINERALIZATION WITHIN ROCK (NODULES ≈ 0.1" IN DIAM.) OVA OF CORE = 0 PPM
	17		END OF BORING		

TILL (?) OR HIGHLY FRACTURED BEDROCK (?)

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Field Borehole Log

CLIENT [illegible] EPA
PROJECT [illegible] OIL
SITE
LOCATION (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR
METHOD OF BORING: SOIL 3 3/4" HOLLOW STEM AUGER
ROCK

JOB NO. C6369 HOLE NO. SB1 SHEET NO. 1 OF 2
WEATHER WARM, RAINY INSPECTOR F. BLA[illegible]
TEMP 70 °F STARTED 11:30 A.M. 7/25 1986
DIP ° FINISHED 3:00 P.M. 7/25 1986
ELEVATIONS: DATUM
CASING DIAM. DRILL PLATFORM
GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

	LOG	DESCRIPTION: COLOR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOR; ETC	ELEV. — DEPTH	*	** TYPE	NO.	SIZE (IN.)	RETD (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT; ETC.
FILL		0-7" BLACK [illegible] 7-13" [?] STIFF BLACK MATERIAL WITH [illegible] ROCK FRAGMENTS	1 2		AQ	SB1	24	13	PUSH PUSH PUSH PUSH	DRY OVA HOLE > 1000 PPM [illegible]
FILL		2-5" SAME AS 7-13" ABOVE	3 4		AQ	2		5	PUSH PUSH PUSH PUSH	MOIST OVA HOLE > 1000 PPM WATER [illegible] AT 4 FT.
FILL ?		0-8" MH GRAY BROWN SILT [illegible] SOFT SMALL ROCK FRAGMENTS, BLACK STAIN [illegible]	5 6		AQ	3		8	PUSH PUSH PUSH PUSH	SATURATED OVA B.Z. = [illegible] PPM OVA HOLE > 1000 PPM (FOR EXPLAN. OF VAPOR READINGS REFER TO [illegible] OLOGY OF SB4.
FILL ?		0-1" SM-ML BLACK POORLY SORTED SILTY-CLAYEY SAND 1-2" ROCK FRAGMENT IN [illegible] OF SPOON	7 8		AQ	4		2	3 3 4 5	LIQUID IN SPOON HEAVY BLACK VISCOUS FLUID WITH [illegible] PIECES OVA HOLE > 1000 PPM
TILL ?		0-2" ROCK FRAGMENTS WITH BLACK FLUID, 2-8" ML BLACK TO DARK BROWN SILTY CLAY WITH ROCK FRAGMENTS, 8-16" SC	9 10		AQ	5		16	5 14 9 13	MEDIUM BROWN SILTY CLAYEY [illegible] SOME SMALL FINE GRAVEL SIZE [illegible] FRAGMENTS PUT UPPER 2" IN SAMPLE: X11 FOR WORST CASE ANALYSIS
LACUSTRINE (?)		0-13" ML MEDIUM GRAY, WELL [illegible] CLAY-SILT, STIFF, SATURATED, NO OBVIOUS OIL STAINING, NO LAYERING	11 12		AQ	6		15	8 10 12 9	13-15" FRACTURED LIMESTONE? FRAGMENT COLLECT SAMPLE: X112
		0-12" OL MED. TO DARK GRAY SILTY CLAY WITH ROOT FRAGMENTS GRAY [illegible] TO BROWN SILT [illegible] WITH [illegible]	13 14		AQ	7		20	9 7 19 17	ROCK FRAGMENT 12-13" ML GRAY SILT; 13-20" ROCK FRAGMENT NO OBVIOUS STAINING; ADD TO SAMPLE X112

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Field Borehole Log

JOB NO. 06369 HOLE NO. SG1 SHEET NO. 2 OF 2

Description	Depth						Blows	Remarks
[illegible] ROCK FRAGMENTS [illegible] NO [illegible] [illegible]	15		AQ	8		11	40 / 12 / 12 / 11	SATURATED
[illegible] ROCK FRAGMENTS [illegible] SILT, NO STRATIFICATION	16 / 17 / 18		AQ	9		17	12 / 11 / 12 / 12	SATURATED
			END OF HOLE					

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Field Borehole Log

CLIENT [illegible] | JOB NO. 06369 HOLE NO. SB2 SHEET NO. 1 OF 1

PROJECT [illegible] | WEATHER FAIR, WARM INSPECTOR [illegible]

SITE | TEMP 70 °F STARTED 7:00 A.M. 7/25 19[illegible]

LOCATION (LATITUDE) (DEPARTURE) BEARING | DIP ° FINISHED [illegible] A.M. 7/25 19[illegible]

CONTRACTOR | ELEVATIONS: DATUM

METHOD OF BORING: SOIL 3¼ INCH HOLLOW STEM AUGERS | CASING DIAM. | DRILL PLATFORM

ROCK | GROUND SURFACE

CORE DIAM. | WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE, B - THIN WALL TUBE, C - PISTON SAMPLER, D - CORE BARREL, E - AUGER, F - WASH, K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT, O - TUBE, P - WATER CONTENT TIN, Q - GLASS JAR, R - CLOTH BAG, S - PLIOFILM BAG, Y - CORE BOX, Z - DISCARDED

LOG	DESCRIPTION: COLOR; CONSISTENCY DENSITY; TEXTURE, STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOR; ETC.	ELEV. DEPTH	*	** TYPE	NO.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING; TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT, ETC.
Fill	0-18" [SW] BLACK COURSE SAND TO FINE GRAVEL SIZE MATERIAL CINDERS (?) 18"-24" LIGHT GRAY WEATHERED [illegible] (?	1, 2	X	AQ	SB2 1	24	24"	PUSH, PUSH, PUSH, 49	OVA JAR = 500 PPM; DAMP [illegible]
Fill	0-8" [?] WHITE FRAGMENTS [illegible] STIFF BLACK MATRIX; 8-16" [ML] DARK BROWN MOIST [illegible] SANDY [illegible]	3, 4	X	AQ	2		16	41, 29, 22, 35	OVA HOLE >1000; OVA B.Z. = 0-1 PPM; LIQUID OVA JAR = 300 PPM
Till?	0-18" [ML] BLACK VERY STIFF MATERIAL WITH ROCK FRAGMENTS MATRIX SILTY/CLAY; LOOKS LIKE [illegible] TILL	5, 6	X	AQ	3		18	40, 45, 45, 17	OVA HOLE >>1000PPM; OVA JAR = [illegible]; COLLECT WORST CASE SAMPLE: X109
Till	0-9" [CL/ML] DARK BROWN, MODERATELY SOFT SILTY/CLAY TILL? TOP PORTION LOOKS OIL STAINED BRICK FR. ROCK or BRICK FRAGMENT	7, 8	X	AQ	4	-	9	7, 9, 9, 7	OVA HOLE >>1000 PPM; B.Z. = 0-1 PPM; FILL(?)
	NO RECOVERY, DRILLER THOUGHT HE MAY HAVE BEEN PUSHING PEBBLE	9, 10	X	A	5		NO RECOVERY	5, 5, 7, 9	OVA HOLE >1000; B.Z. = 3 PPM
	0-4" [MH] DARK BROWN, SILTY CLAY SOFT - VERY SOFT; 0-5" [MH] SAME AS ABOVE	11, 12	X	AQ	6		4	3, 3, 3, 5	OVA B.Z. = 0 PEAKING AT 4 PPM
	5-13" [SM] LIGHT BROWN, LAMINATED FINE SAND AND SILT BEDS VERY THIN LAMINA, NO OBVIOUS STAINING MOIST	13	X	AQ	7		14	3, 4, 5, 103	REFUSAL AT BOTTOM; LIMESTONE(?) FRAGMENTS IN SPOON; SAMPLE COLLECTED FOR CHEMICAL ANALYSIS: X110

END OF BORING

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Field Borehole Log

CLIENT [illegible] | JOB NO. [illegible] HOLE NO. SB5 SHEET NO. 1 OF [illegible]
PROJECT [illegible] | WEATHER HOT SUNNY INSPECTOR A. BLACKMER
SITE | TEMP. 92 °F STARTED 10:00 A.M. 7/26 19[illegible]
LOCATION (LATITUDE) (DEPARTURE) BEARING | DIP ° FINISHED [illegible] P.M. 7/[illegible] 19[illegible]
CONTRACTOR | ELEVATIONS: DATUM
METHOD OF BORING: SOIL [illegible] HOLLOW STEM AUGER | CASING DIAM. | DRILL PLATFORM
ROCK | | GROUND SURFACE
CORE DIAM. | WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
*SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
**SAMPLING METHOD: A - SPLIT TUBE, B - THIN WALL TUBE, C - PISTON SAMPLER, D - CORE BARREL, E - AUGER, F - WASH, K - SLOTTED SAMPLER
**SHIPPING CONTAINER: N - INSERT, O - TUBE, P - WATER CONTENT TIN, Q - GLASS JAR, R - CLOTH BAG, S - PLIOFILM BAG, Y - CORE BOX, Z - DISCARDED

LOG	DESCRIPTION: COLOR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOR; ETC	ELEV. / DEPTH	*	** TYPE	NO.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING; TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT; ETC.
FILL	0-13" BLACK [illegible]	1	X	AQ	SB51	24	13	PUSH, PUSH, PUSH, PUSH	DRY PICTURES
FILL	0-5" SC/SM SILT CLAY LOAM WITH [illegible] DEBRIS	2–3	X	AQ	2		15	7, 13, 17, 15	DRY
TILL(?)	0-20 ML DARK BROWN TO YELLOW BROWN, CLAY SILT	4–5	X	AQ	3		20	6, 7, 8, 12	MOIST NO OBVIOUS STAINING
TILL	0-20" ML SAME AS ABOVE	6–7	X	AQ	4	APPROX ? WATER TABLE	20	2, 2, 4, 8	VERY MOIST (SATURATED ?) NO OBVIOUS STAINING
	0-20 ML-CL SAME AS ABOVE WITH A HIGHER CLAY CONTENT	8–9	X	AQ	5		20	4, 5, 6, 8	
	0-7" ML-CL SAME AS ABOVE 7-14" ML YELLOW BROWN SILT CLAY WITH WELL ROUNDED PEBBLE 14-20" ML GRAY SILT WITH	10–11	X	AQ	6		20	4, 5, 9, 20	ONE INCH LAYER OF FINE SAND SATURATED; SHELL FRAGMENT IN YELLOW BROWN SILT/CLAY (SNAIL) (GRAY SILT SAPPOROLITE ?)
	0-16" ML GRAY, CLAY SILT WITH SMALL TO COARSE GRAVEL SIZE, WELL ROUNDED MATERIAL	12–13–14	X	AQ	7		16	9, 9, 20, 16	SATURATED COLLECT SAMPLE X113 FOR CHEMICAL ANALYSIS

WEHRAN ENGINEERING
CONSULTING ENGINEERS

Field Borehole Log

JOB NO 06369 HOLE NO SB5 SHEET NO __ OF __

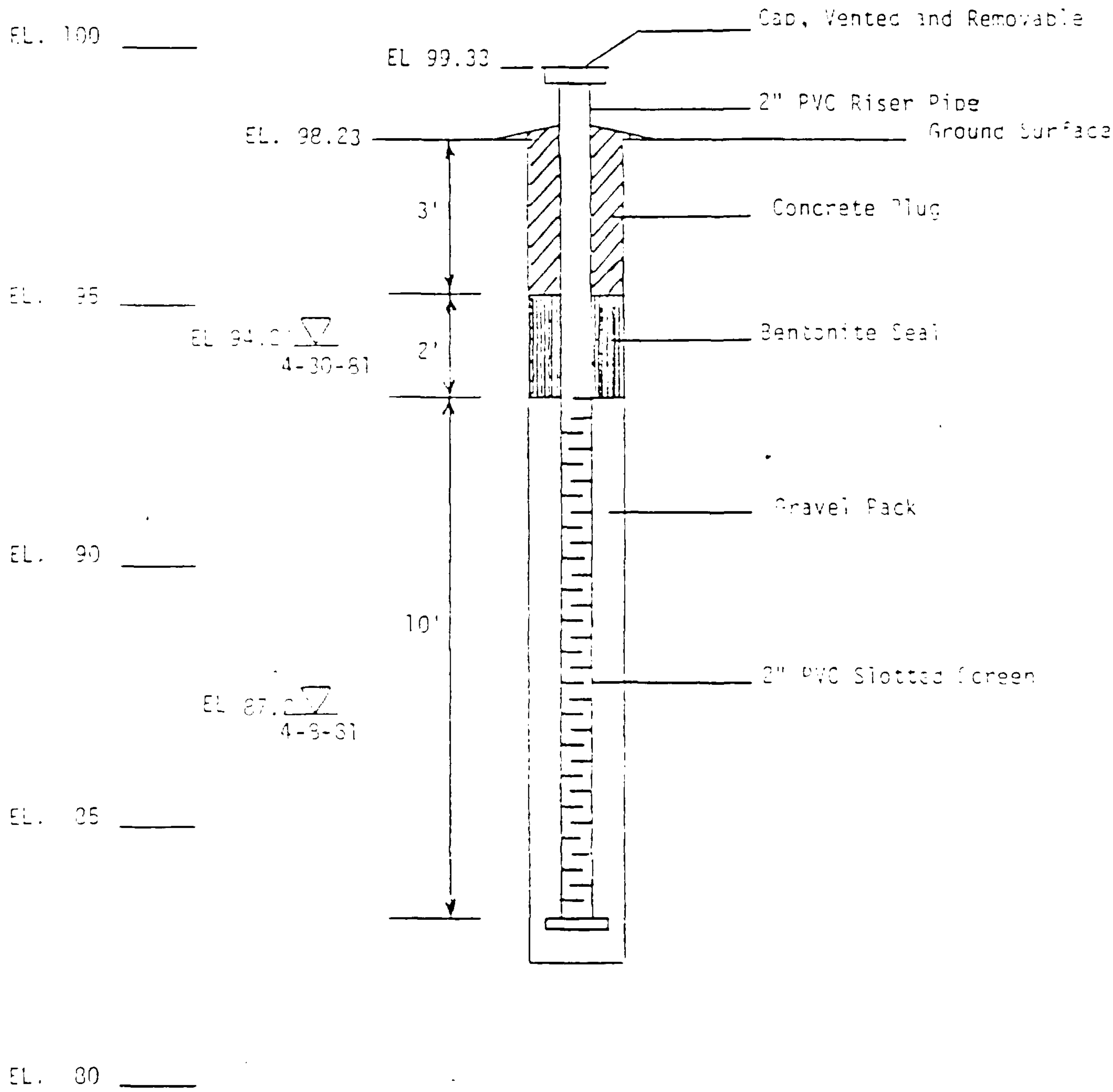
Description	Depth	Sample					Blows	Remarks
[illegible] MED. GRAY SILT [illegible] MEDIUM - COARSE		X	AQ	3		9	9	SATURATED
							9	
WELL SORTED SAND	15						10	
	16						13	
STOP [illegible]			END OF HOLE					
THERE IS NO EVIDENCE OF OBVIOUS CONTAMINATION								
OUTSIDE OF LAGOON AREA								
NOTE: BORING ORIGINALLY LOCATED SOUTH OF								
[illegible] T-28 AND NEXT DUMP TRUCK. SOLID OBJECT								
HIT AT 2 FT BELOW GROUND SURFACE. GROUND								
VIBRATED WHEN OBJECT TAPPED WITH SAMPLER.								
HOLE ABANDONED AND SB-5 MOVED TO NEW								
LOCATION								

APPENDIX B

WELL CONSTRUCTION LOGS

STS Job No. 22132

Land Oil Service
Jeans Road
Lemont, Illinois

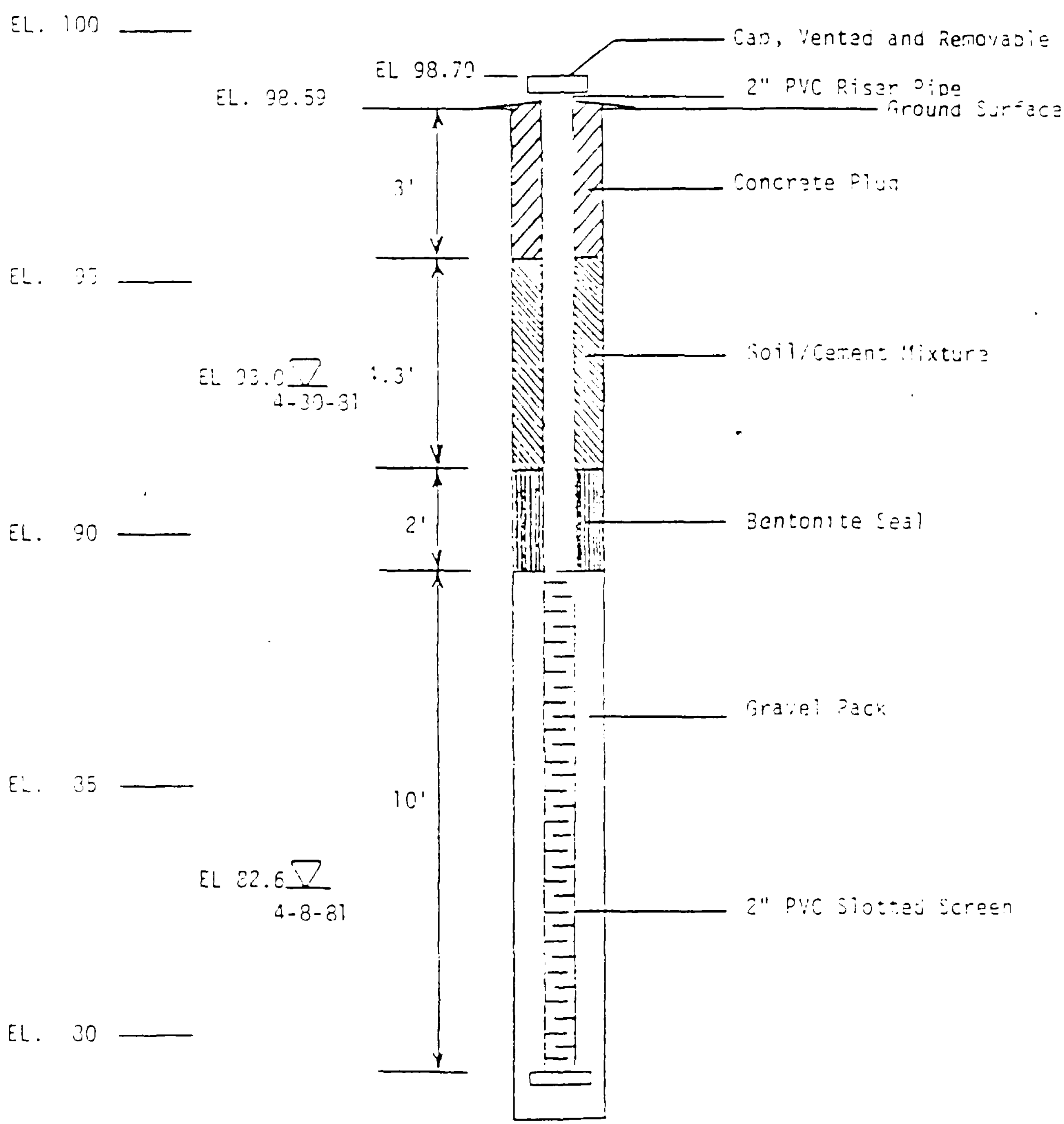


OW-1

CONSTRUCTION DETAILS

STS Job No. 22102

Lenz Oil Service
Jeans Road
Lemont, Illinois

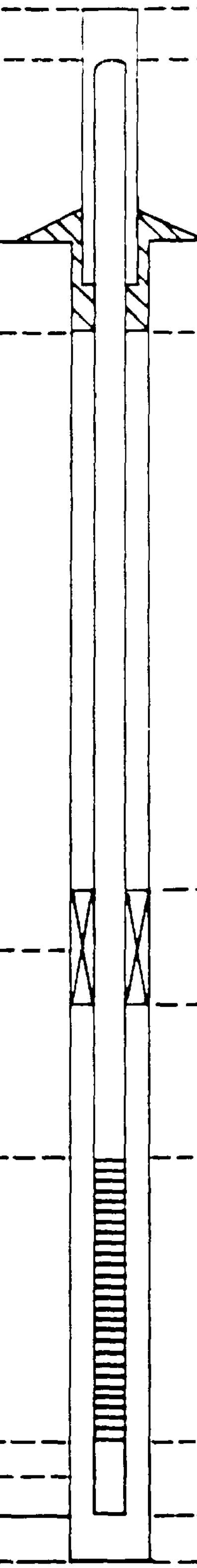


OW-2

CONSTRUCTION DETAILS

MONITOR WELL CONSTRUCTION

Location: *Lemont*
Site No.: *Lenz Oil*
Well No.: *101-M*
Prepared by: *D. Grele*



Depth (Elevation)

Top of Protective Cover ( )
Top of Casing (*+3.54*)

Ground Surface (*0.00*)

Surface cap (*-1.50*)

Packed with *portland cement with 5% bentonite*

(*-16.50*)

Bentonite seal

(*-17.50*)

Packed with *benTonite pellets*

(*-18.53*)

Screen

Total length ____

Packed with *Ottawa Silica #4 sand*

(*-23.53*)

Cap length

Bottom of casing (*-24.00*)

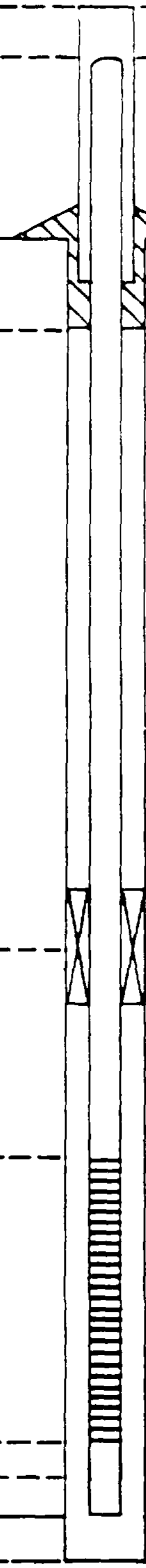
Bottom of boring (*-24.00*)

Pipe: Type and quantity *2" 316 Stainless Steel, flush threaded, .01" continuous wire wound screen. 2-10' risers, 1-2' riser, 1-5' screen, 1 cap and plug*

IL 532-1952
LPC 222 1/86

MONITOR WELL CONSTRUCTION

Location: Lemont
Site No.: Len20.1
Well No.: G101L
Prepared by: D Grede



Top of Protective Cover (——)

Top of Casing (+2.92)

Depth (Elevation)

Ground Surface (0.00)

~~Surface cap~~ (N/A)

Packed with cement with 5% bentonite

(-25.09)

Bentonite seal

(-27.09)

Packed with PURE Bentonite

(-28.90)

Screen

Total length 2.00

Packed with #4 Silic sand and in situ dolomite chips

(-30.92)

Cap length

Bottom of casing (-31.39)

Bottom of boring (-32.09)

Pipe: Type and quantity 2" 316 Stainless Steel, flush threaded, .01 Continuous wire wrapped Screen - 316 stainless steel, 1 Cap, 1-2' screen 1-2' Riser and 3-10' Risers

IL 532-1952
LPC 222 1/88

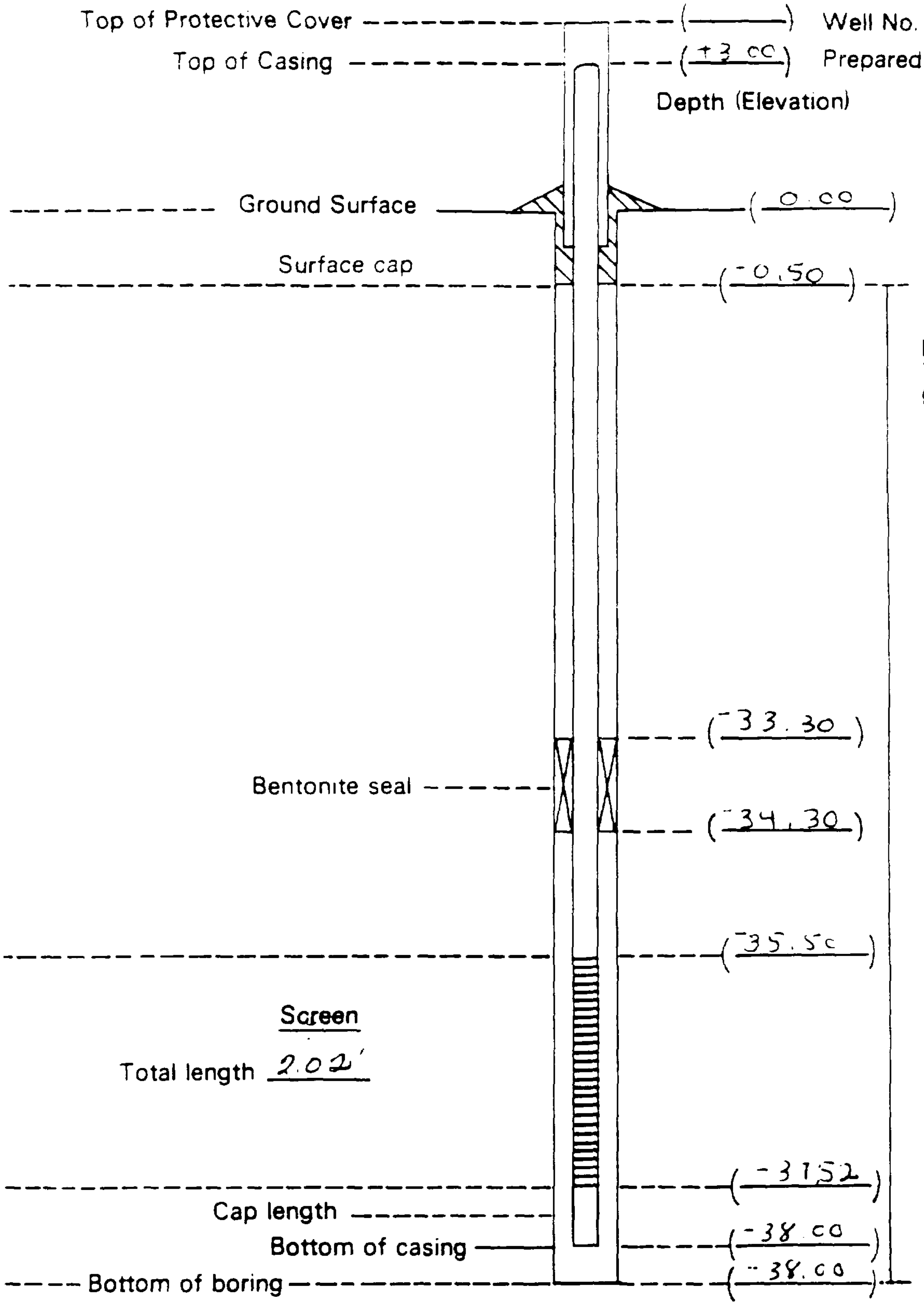
MONITOR WELL CONSTRUCTION

Location: Lemont

Site No.: Lenz Oil

Well No.: 101 D

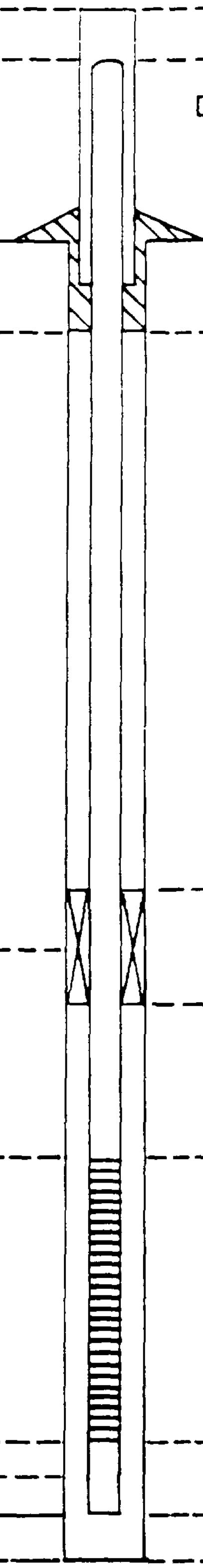
Prepared by: J. Grede



Pipe: Type and quantity 316 Stainless steel - flush jointed with .01" wire - wound screen. 4-10' risers, 1-2' screen, plug Removed 1.76' from top riser.

MONITOR WELL CONSTRUCTION

Location: Lemont-Lenz 3
Site No.:
Well No.: G102L
Prepared by: DWGrede



Depth (Elevation)

Top of Protective Cover ( )

Top of Casing (3.00)

Ground Surface (0.00)

Surface cap ( )

Packed with portland cement with 5% bentonite.

Bentonite seal (-8.98) (-9.98)

Packed with bentonite pellets - 1/2"

(11.26)

Screen

Total length 2.02'

Packed with #4 ottawa Silica Sand. Flushed 3x

(~~0~~13.28)

Cap length 0.43

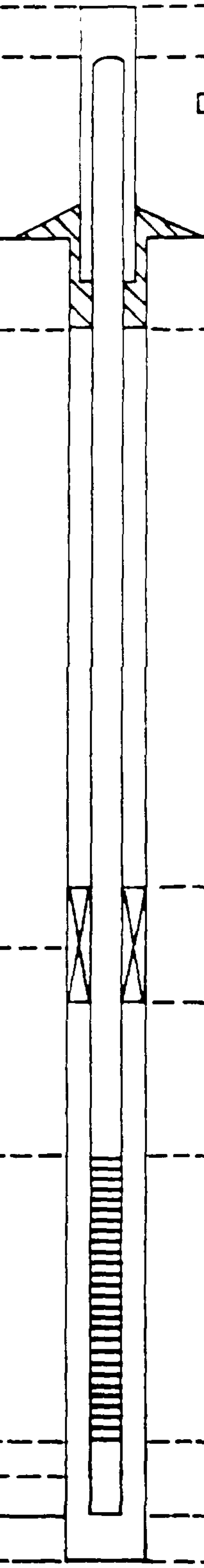
Bottom of casing (13.75)

Bottom of boring (13.75)

Pipe: Type and quantity 316 Stainless Steel flush jointed, .01" slot wire woun 316 stainless steel screen, 1 plug, 1-2' screen, 1-10' riser and 1-5' ris at which 1.18' was removed for a 3.00' stick up.

MONITOR WELL CONSTRUCTION

Location: Lemont
Site No.: Lenz Oil
Well No.: 102-D
Prepared by: D. Grede



Top of Protective Cover (——)
Top of Casing (+3.00)
Depth (Elevation)

Ground Surface (0.0)

Surface cap (-0.5)

Packed with portland cement with 5% bentonite

(-13.80)

Bentonite seal

(-14.80)

Packed with bentonite pellets

(-16.01)

Screen

Total length 2.02

Packed with #4 Ottawa Silica Sand

(-18.03)

Cap length 0.48

Bottom of casing (-18.51)

Bottom of boring (-18.51)

Pipe: Type and quantity 316 Stainless steel, flush jointed, .01" continuous wire wraped screen. 5/28/86 1- Plug, 1-2' Screen, 2-10' Risers

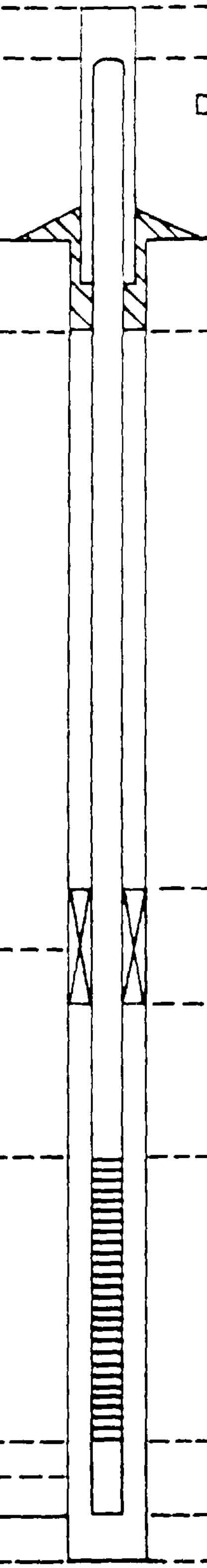
MONITOR WELL CONSTRUCTION

Location: Lemont

Site No.: Lenz Oil

Well No.: 104 L

Prepared by: D. W. Grede



Depth (Elevation)

Top of Protective Cover ( )

Top of Casing (+3.00)

Ground Surface (0.0)

Surface cap (-0.5)

Packed with portland cement with 5% bentonite

Bentonite seal (-3.00) (-4.00)

Packed with bentonite pellets

(-4.99)

Screen

Total length

Packed with #4 ottawa silica sand and in situ dolomite chips

(-7.03)

Cap length

Bottom of casing (-7.49)

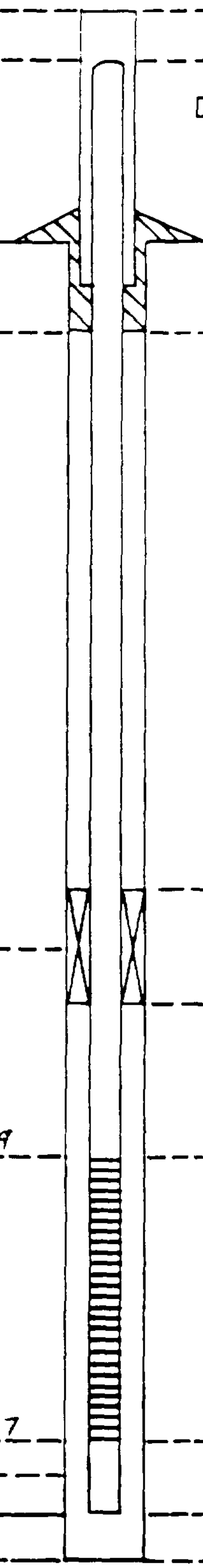
Bottom of boring (-8.20)

Pipe: Type and quantity 316 Stainless steel, flush jointed. .01" continuous wire wound screen. 1 cap, 1-2' screen, 1-2' riser, 1-5' riser, 1.8' cutoff piece.

IL 532-1952

MONITOR WELL CONSTRUCTION

Location: Lemont-Lone C
Site No.:
Well No.: 104D
Prepared by: DWGroda 5/14/86



Top of Protective Cover (____)
Top of Casing (+3.00)
Depth (Elevation)

Ground Surface (0.00)
SACRETE
Surface cap (-0.5)

Packed with Portland cement with 5% bentonite

(-9.0)
Bentonite seal
(-10.0)
Packed with bentonite pellets

2.49 (-10.90)

Screen
Total length 2.02

Packed with #4 OH Silica Sand and in gravel chips.

0.47 (-12.92)
Cap length 0.14
Bottom of casing (-13.39)
Bottom of boring (-13.50)

Pipe: Type and quantity 316 Stainless Steel, flush jointed, .01 wire wound screen 1 plug, 1-2' screen, 1-10' riser, 1-5' riser. Removed 1.45' from top for stick up = 3.0'. Protective cover (4") and American 5100 lock.

IL 532-1952
LPC 222 1/88

WEHRAN ENGINEERING
CONSULTING ENGINEERS

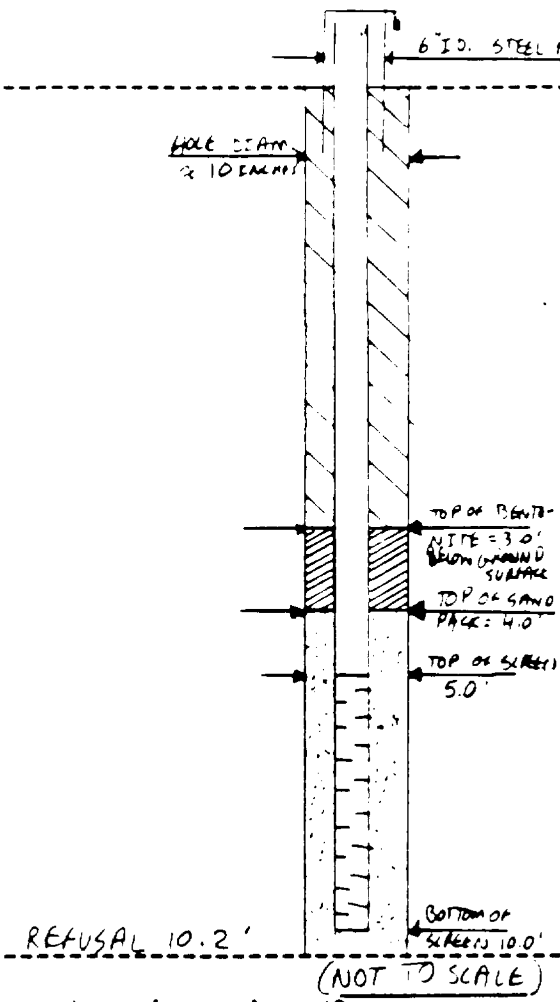
WELL CONSTRUCTION DESIGN

Job: 06364
Well Number: L105S

Date: 7/16/86
Time taken to install: [illegible]
Name: A. BLACKMER

Ground Surface

General Geologic Log
REFER TO 554 LOG



STICK-UP (TOC): ≈ 3 FEET

Riser Size: [illegible] STAINLESS STEEL FLUSH THREADED

Casing Size: [illegible]

Backfill: 5% BENTONITE [illegible]
(type)

Bentonite Seal:
(type ?)
AMERICAN COLLOID COMPANY SUPER GEL BENTONITE POWDER SLURRY

Sandpack: SILICA SAND
(type) [illegible]

Screen size and type:
2" DIAM 316 STAINLESS STEEL
5' LONG [illegible] SLOTS
FLUSH THREADED

Questions: How were annular materials emplaced?
SAND PACK POURED INTO ANNULAR SPACE; BENTONITE SEAL AND GROUTED TREMMIED

How were depths to materials measured?
CHECKED WITH TAPE AND WEIGHT

How developed?
AIR LIFT

How long?
4 HOURS

What parameters were measured?
– PARAMETERS MEASURED DURING PURGE FOR SAMPLING
– RELATIVE TURBIDITY DURING DEVELOPMENT

Drilling and Installation Chronology:
REFER TO CHRONOLOGY OF L105S AND L105D

Comments and Problems:
NO PROBLEMS ENCOUNTERED

WEHRAN ENGINEERING
CONSULTING ENGINEERS

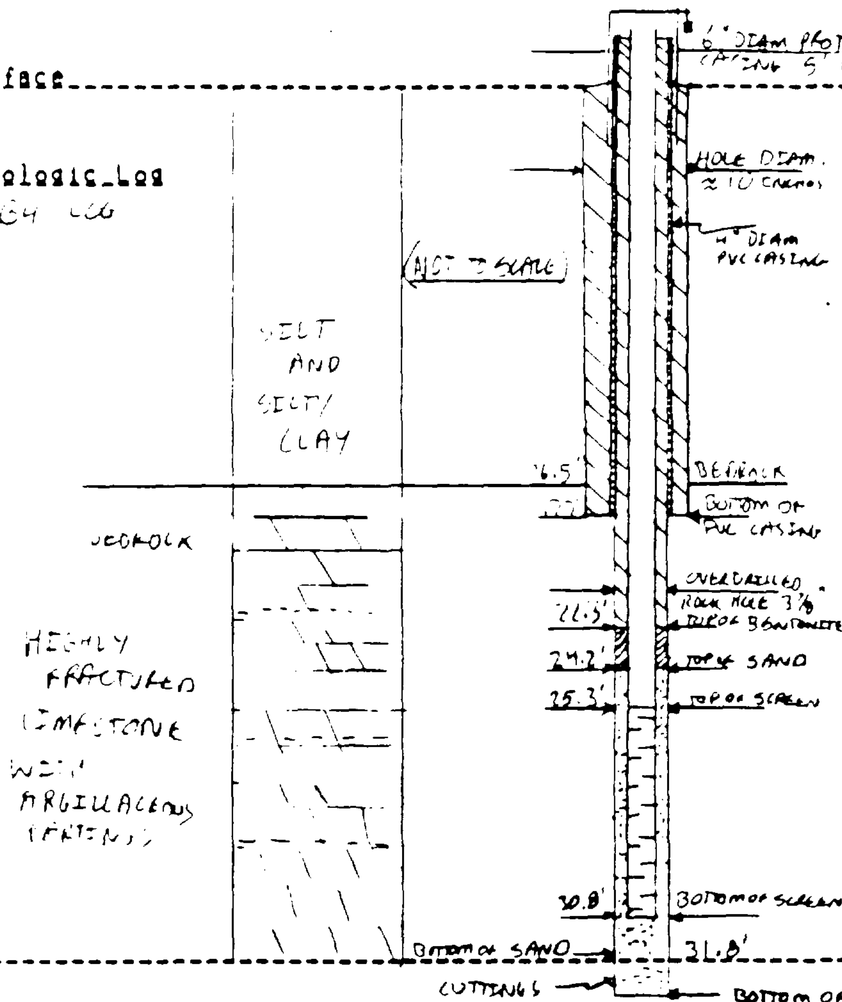
WELL CONSTRUCTION DESIGN

Job: 06367
Well Number: L105D

Date: 7/2/86
Time taken to install: [illegible]
Name: R. BLACKMAN

Ground Surface

General Geologic Log
REFER TO SB4 LOG



STICK-UP (TOC): ≈ 3 FEET

Riser Size: 2 INCH DIAM. 316 STAINLESS STEEL FLUSH THREADED

Casing Size: 4" DIAM PVC SCHEDULE 40 CASING

Backfill (type): 5% BENTONITE GROUT

Bentonite Seal (type ?): BENTONITE POWDER IN A HEAVY SLURRY TREMIED IN.

Sandpack (type): SILICA SAND

Screen size and type: 0.010 INCH SLOT, 2" DIAM 316 STAINLESS STEEL, FLUSH THREADED

Questions: How were annular materials emplaced?
SAND PACK POURED THROUGH FUNNEL DRY, BENTONITE SEAL AND GROUT TREMIED

How were depths to materials measured?
CHECKED WITH TAPE AND WEIGHT

How developed?
AIR LIFT

How long?
4 HOURS

What parameters were measured?
- PARAMETERS MEASURED DURING PURGE FOR SAMPLING
- RELATIVE TURBIDITY DURING DEVELOPMENT

Drilling and Installation Chronology:
REFER TO CHRONOLOGY OF L105S, L105D AND SB4

Comments and Problems:
HAD PROBLEMS FLUSHING CUTTINGS BECAUSE OF LOSS OF CIRCULATION WITH [illegible] FRACTURES. SOLUTION: OVERDRILLED HOLE LET CUTTINGS FLOW INTO SUMP, INSTALLED SAND PACK ON TOP OF CUTTINGS

WEHRAN ENGINEERING
CONSULTING ENGINEERS

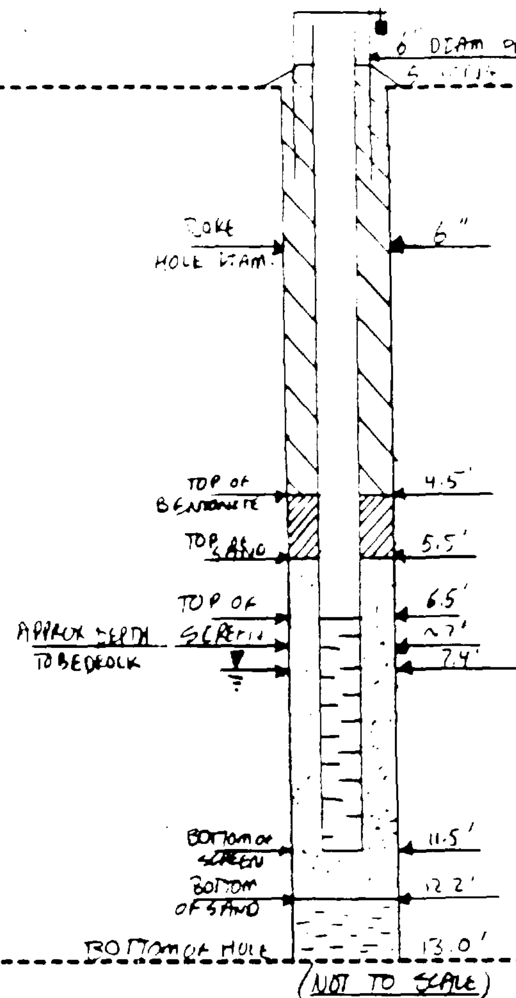
WELL CONSTRUCTION DESIGN

Job: 06362 | Date: 7/23/86
Well Number: L106S | Time taken to install:
Name: [illegible]

Ground Surface

General Geologic Log

REFER TO L106 SB3



STICK-UP (TOC): [illegible]

Riser Size: 2 INCH DIAM STAINLESS STEEL, FLUSH THREADED

Casing Size: BORE HOLE DIAM WITH 5 7/8 INCH TRICONE BIT

Backfill:
(type) 5% BENTONITE [illegible]

Bentonite Seal:
(type ?)
1/2 INCH DIAMETER [illegible] PELLETS

Sandpack: SILICA SAND
(type) [illegible]

Screen size and type:
0.1 SLOT 2 INCH DIAM STAINLESS STEEL 5' LONG (FLUSH [illegible]

Questions: How were annular materials emplaced?
SAND PACK AND BENTONITE PELLETS DRY POURED, GROUT TREMMIED

How were depths to materials measured?
TAPE AND WEIGHT

How developed?
AIR LIFT

How long?
5 HOURS

What parameters were measured?
- PARAMETERS MEASURED DURING PURGE FOR SAMPLING
- RELATIVE TURBIDITY DURING DEVELOPMENT

Drilling and Installation Chronology:

REFER TO CHRONOLOGY OF L106 AND SB3

Comments and Problems:

NO PROBLEMS ENCOUNTERED

WEHRAN ENGINEERING
CONSULTING ENGINEERS

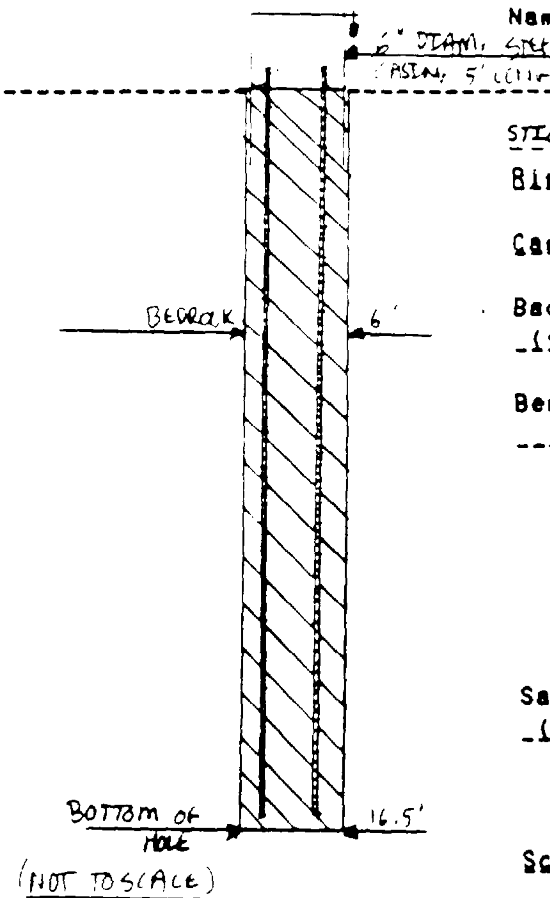
WELL_CONSTRUCTION_DESIGN

NOT COMPLETED

Job: 06369
Well Number: L106D

Date: 7/21/86
Time taken to install:
Name: A BLACKMER

Ground_Surface



General_Geologic_Log
REFER TO LOG FOR OB3/L106

STICK-UP (TOC):

Riser_Size:

Casing_Size: 4" PVC CASING

Backfill:
(type) ~5% BENTONITE GROUT

Bentonite Seal:
___(type ?)____

Sandpack:
_(type)

Screen_size_and_type:

Questions: How were annular materials emplaced?

How were depths to materials measured?

How developed? How long?

What parameters were measured?

Drilling_and_Installation_Chronology:

Comments_and_Problems:
WELL NEVER COMPLETED